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NEXT WEEK . . .

Photography in Machining
Mechanical Finishes for Aluminum
Obtaining Uniform Welding Results
Storing Engineering Materials
Blast Furnace Thermal Requirements

STEEL

The Magazine of Metalworking and Metalproducing

VOL. 120, NO. 10 MARCH 10, 1947

NEWS

TECHNICAL

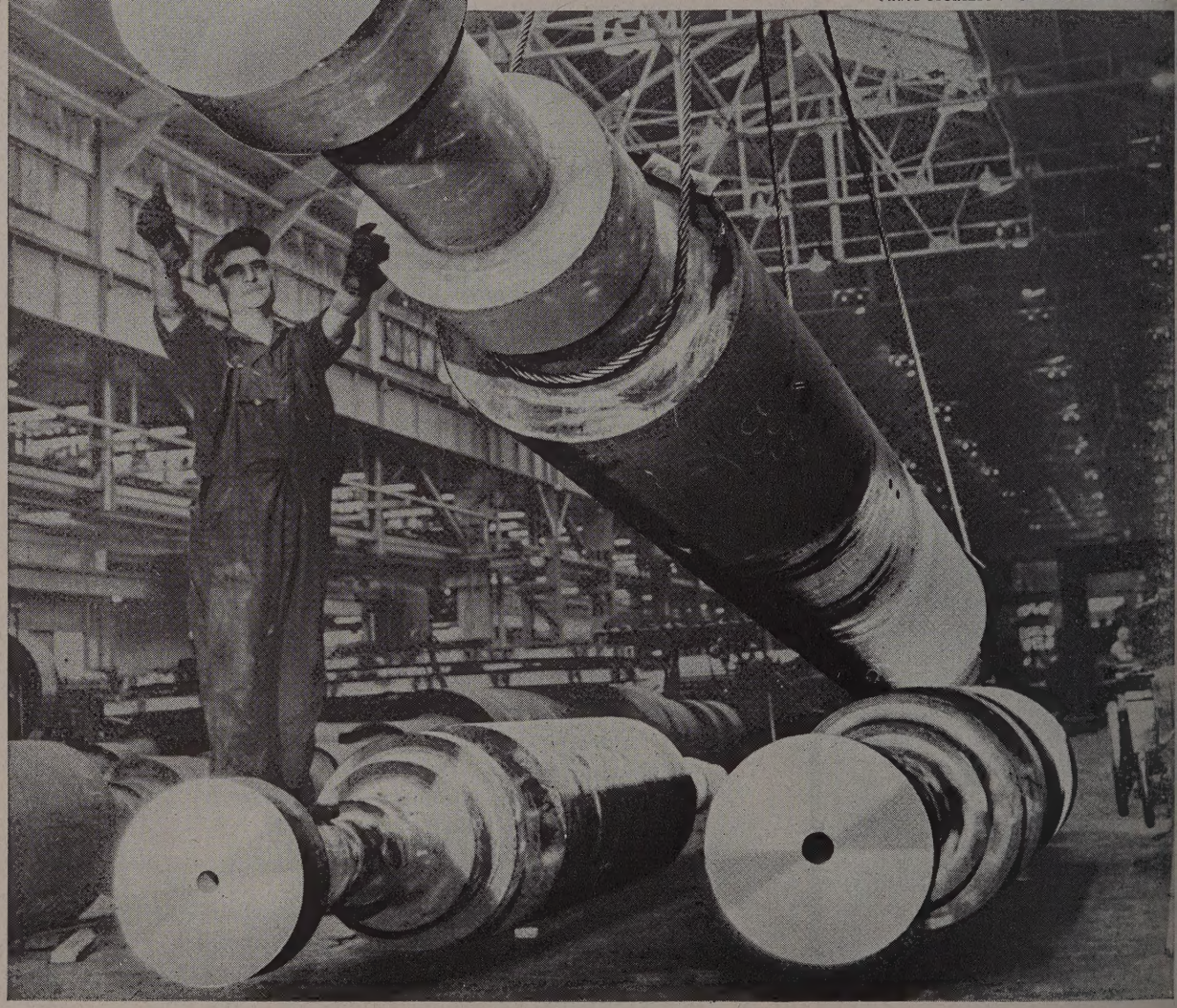
MARKETS

★ Denotes regular features.

Why NICKEL Alloy Steels Are Specified for Giant Generator Shafts

Alloy steel containing two and a half percent Nickel along with small percentages of other alloying elements give the heavy sections of this turbine rotor shaft the strength, toughness and endurance so vital to dependable performance. A yield strength of 80,000 p.s.i. combined with reduction of area consistently exceeding 36% in both radial and transverse directions was achieved in this heavy section.

PHOTO COURTESY OF GENERAL ELECTRIC CO.



HEADED FOR THE LARGEST TURBO-GENERATOR OF ITS TYPE IN THE WORLD

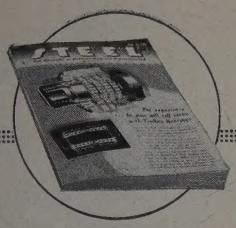
This 75,000 pound Nickel alloy steel rotor shaft will serve in a new record size turbine generator rated at 100,000 KW, 77 feet long, 17 feet wide and designed for inlet conditions of 1250 p.s.i. and 1000° F.

INCO Nickel

TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the selection, fabrication, treatment and performance of engineering steels, stainless steels, cast irons, brasses, bronzes and other alloys containing Nickel. This information and data are yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N.Y.



March 10, 1947

Big Job Ahead

Britain's White Paper, "Economic Survey for 1947," presented by the Labor government to Parliament on Feb. 21, is the most important document that has been released officially by a leading nation in a long time. It outlines frankly the deterioration of economic conditions in a country which for a century has held a strong balance of power in world affairs. It warns the British people that unless certain important correctives are applied soon, "we may never restore the foundations of our national life."

As one reads in the White Paper of the factors contributing to the present crisis and of the desperate measures proposed to combat it, and realizes that the situation is so grave that Britain must give up commitments throughout the world that have been highly advantageous to her, one recalls Winston Churchill's often-repeated retort that he had received no mandate from his majesty's subjects to liquidate the British Empire. Mr. Churchill was right in saying that the people had not given him a mandate; nevertheless, a force more powerful than the will of the people was operating. It was the economic law which decrees that one cannot have his cake and eat it too.

Consequently, Britain must withdraw from some of her farflung outposts. A day may come soon when it no longer can be said that the sun never sets on the British flag.

The repercussions of these withdrawals will hit the United States violently. Every spot on the world's surface that is abandoned by Britain immediately will become a vacuum into which will flow an administrative authority that is either pro-USSR or pro-USA. Britain's weakness will throw a tremendous additional burden upon our nation, if the influence and prestige of the Western powers are to be preserved.

American industry has an important stake in decisions which our government must make in meeting this crisis. Whether we decide to bolster Britain financially so that she can carry on in areas from which she threatens to withdraw or whether we decide to take over where she steps out, the result will be new responsibilities in foreign affairs that will dwarf anything we have ever known.

Destiny has thrown us into a position of potential world leadership for which we are poorly prepared. The sooner we appreciate this fact and realize that the unprecedented responsibility is matched by unparalleled opportunity, the sooner we will get started on what will prove to be the biggest task of all time.

* * *

IMPORTANT DECISION: In a welcome departure from its practice of handing down decisions on Mondays, the Supreme Court last Thursday surprised everybody by announcing its ruling in the John L. Lewis-United Mine Workers case.

A majority of the court upheld the decision of the district court which found Mr. Lewis and the union guilty of criminal and civil contempt. The fine of $10,000 assessed against Mr. Lewis remains unchanged but the fine of $3,500,000 issued against the union was to be reduced to $700,000 if the union shows within five days that it has fully complied with the lower court's order. This means that to escape the higher fine the union must withdraw unconditionally the notice it sent to Secretary of Interior Krug terminating the Krug-Lewis agreement. The majority also declared that there is nothing in the Norris-LaGuardia Anti-injunction or the War Labor Disputes Acts to prevent the government from protecting the public interest as in this instance.

An ironic aspect of the decision, from the standpoint of Mr. Lewis, is the fact that a court appointed

(OVER)

largely by a President who was placed in office with the help of liberal financial assistance from the miners' union has ruled against that union and its leader.

The decision revives faith in the processes of justice and helps to postpone a threatened stoppage in coal output. —p. 59

* * *

FOUNDRIES EXPANDING: Our sister publication, "The Foundry," has completed a survey of the foundry industry based on reports from more than 1500 casting plants in the United States and Canada. It shows that foundry capacity, although expanded substantially during the war and early postwar period, will be further increased by more than 16 per cent in 1947.

About 65 per cent of all foundries have on order or expect to buy new equipment this year. Purchases are greatest in the nonferrous and gray iron fields. Analysis of the type of equipment being ordered indicates that foundrymen not only are seeking additional capacity, but also are modernizing for greater efficiency and for the purpose of providing working conditions that will be more attractive to foundry workers than in the past.

The expansion is based upon the expectation that foundry operations will average better than 85 per cent of capacity during the next five years. —p. 66

* * *

RELIEF IS IN SIGHT: Consumers who are moving heaven and earth in attempts to obtain enough steel to keep their plants going are likely to view steel capacity from an angle that is quite different from that from which producers must consider expenditures for increased capacity.

From the long-range viewpoint, the outlook for steel supply is encouraging. In fact, the short-term prospect would not be too bad if one could count on a continuance of steel production at present levels. At current rates of output, steel ingot production in 1947 would be about 85 million tons, which would mean 60 million tons of finished steel—a peacetime record.

Steel producers expect to spend $448 million in 1947 for expansion and improvement of facilities. This is in addition to $300 million spent for like purposes last year. Meanwhile, new capacity is coming into operation and sustained high-level activity is helping operators to get more tonnage out of existing equipment.

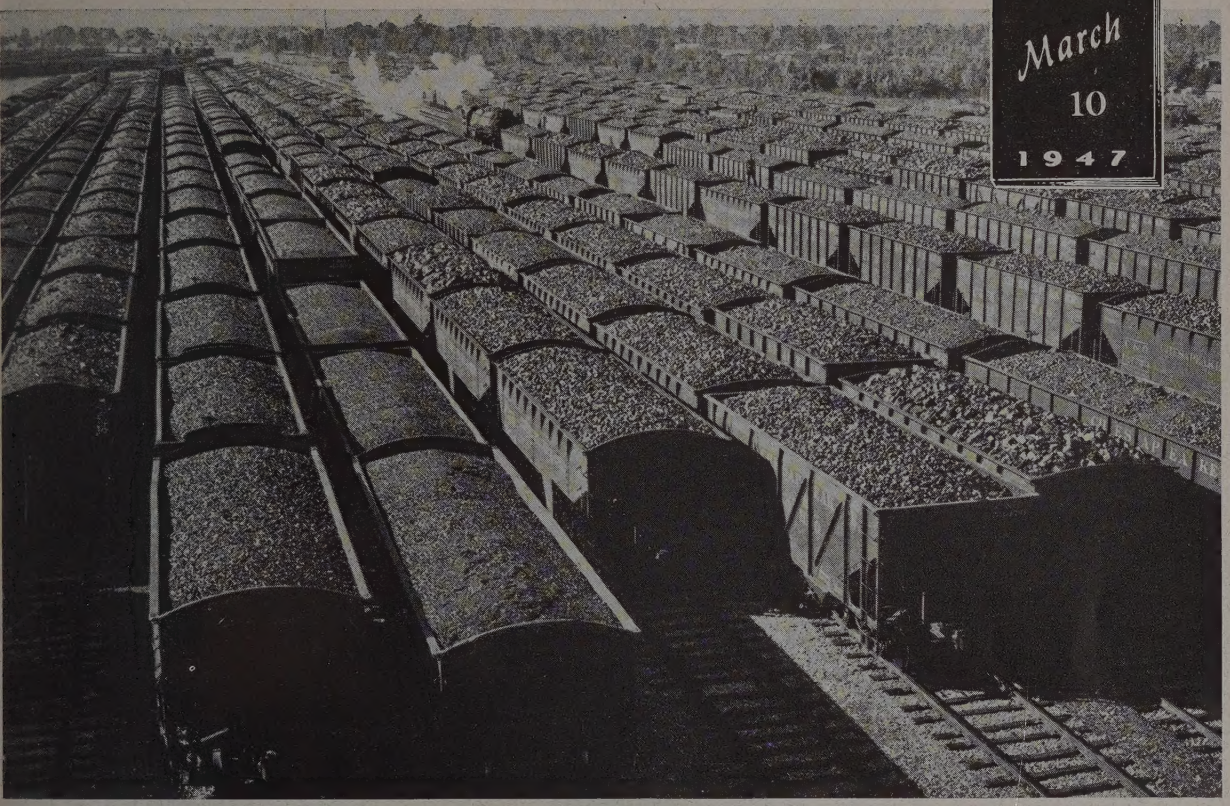
Relief is not too far distant. —p. 62

SIGNS OF THE TIMES: In spite of acute shortages of sheet, strip, pig iron, coke, copper, lead and standard parts, automobile manufacturers have been turning out automobiles and trucks at a rate of better than 100,000 units per week for three consecutive weeks. Significantly, this output, which corresponds to an annual production of 5 million units (p. 75), is being accomplished with a working force that is perceptibly smaller than that employed last fall when assemblies were considerably below current levels. . . . Between Nov. 20 and Dec. 31 OPA discharged 15,000 employees. A recent check (p. 68) indicates that 91 per cent of those dismissed have found jobs in private industry. . . . High cost of construction has caused numerous manufacturers in northern California to shelve building and expansion plans (p. 72) until conditions are more favorable. . . . A Cincinnati lathe manufacturer has hit upon a novel use of cellophane sheets, printed in color, to show the "anatomy" of its product. Each of five double cellophane sheets shows front and back views of successive layers or details of construction (p. 90), permitting the prospective buyer to obtain an excellent idea of the important features of the lathe. . . . Recent newspaper advertising of the revolutionary design of the Tucker automobile (p. 76) focuses attention upon activities in the former Dodge Chicago engine plant, where preliminary work on the new car is in progress. . . . Glass fibers may rate as an engineering material to be reckoned with in the future. It possesses the greatest tensile strength-weight ratio (p. 95) of any commercial material either occurring in nature or synthesized by man. . . . United States Employment Service says that labor turnover is declining steadily (p. 80), indicating more stable conditions. In December, industrial workers quit jobs or took new ones at the lowest rate since early in the war. Quit rate was 29 per thousand employees. . . . Outcome of the Moscow conference, which begins this week (p. 68), can be important to American industry. Any solution of the German problem, or of any other issues discussed by the diplomats, will clarify in some degree the extent to which our nation will be called upon to carry on occupation, relief and rehabilitation work throughout the world. When the dimensions of this job are more clearly defined, we will have for the first time since the war a chance to do some realistic figuring on our tax burden for the next decade or more.

E. L. Shaner

EDITOR-IN-CHIEF

STEEL
March
10
1947



Coal keeps moving to supply consumers' demands for about 55 million tons monthly, necessitated by current high industrial activity. Last week's Supreme Court decision upholding the injunction against John L. Lewis and the United Mine Workers obviates the threat of a mine strike Apr. 1

Coal Strike Threat Deferred by High Court Ruling Against Lewis

No stoppage likely before June 30 when government must return mines to private operators. Owners and union to attempt to negotiate new contract. Decision brightens prospects for continued high metalworking activity

PROSPECTS for continued high and uninterrupted metalworking operations throughout the first half year were enhanced last week by the Supreme Court's surprise decision reaffirming the contempt citation against John L. Lewis and the United Mine Workers.

Washington and industry observers believed the decision obviated the threat of a new coal strike for the duration of federal control of the mines, or until July 1. Coal Mines Administrator Collisson stated he believed "prospects are good" that there will be no coal strike this year.

Prior to the court's decision, the specter of a new coal walkout Apr. 1 had hung heavily over the steel and metalworking industry. Had the court ruled in Lewis' favor, as many had expected, the way would have been open for another coal strike. Such a stoppage would have come at a time when coal stocks are much lower than at the start of the two strikes in 1946. Present coal reserves are estimated to be equal only to 27 days' operations, compared with 42 days' supplies at the start of the April-May strike last year and to 37 days' supplies at the beginning of last November. Had Lewis been able to call a new strike Apr. 1, the brakes would have been slammed on industrial activity with much greater impact than was the case in either of the 1946 strikes.

The action of the Supreme Court caught all interested parties off guard. Usually the court hands down decisions only on Mondays. However, when the court convened for a regular argument session on Thursday, Mar. 6, Chief Justice Vinson read the majority decision upholding the contempt citation against Lewis and the UMW handed down in December by Federal District Court in Washington. The Supreme Court also upheld the $10,000 fine assessed against Lewis personally. The $3,500,000 fine levied against the union was reduced to $700,000 on condition that it complies with the lower court's order within five days. Otherwise, the union must pay an additional fine of $2,800,000.

"The defendant union," Chief Justice Vinson said, "can effect full compliance only by withdrawing uncon-

Coal being loaded for export at the Chesapeake & Ohio's low level pier at Newport News, Va. Last year's mine strikes interfered with shipments to war-devastated Europe, retarded industrial rehabilitation abroad

ditionally the notice given by it, signed by John L. Lewis, to J. A. Krug, Secretary of the Interior, terminating the Krug-Lewis agreement as of midnight Nov. 20 and by notifying, at the same time, its members of such withdrawal."

The court held that neither the Norris-La Guardia Anti-Injunction Act nor the War Labor Disputes Act prevents the government from taking any of the actions that it did take.

Justices Murphy and Rutledge wrote dissenting opinions. A concurring opinion was written by Justice Frankfurter. Opinions partially concurring and partially dissenting were written by Justices Black and Douglas.

Immediately following the Supreme Court action, machinery was set in motion to start negotiations between the coal mine operators and the union in an attempt to reach an agreement before June 30 when the government must return the coal mines to the owners, due to expiration of the Smith-Connally Act. The mines have been under government control since last May when they were seized to end the two month spring strike which had virtually paralyzed the country and had cut steel mill operations from a prestrike rate of 90 per cent to 43 per cent of capacity.

Coal mines operators last week announced they were ready to meet with Lewis and other UMW negotiators at any time the government called them. The operators believed the Supreme Court ruling dissipates fears of a coal strike until June 30, but indicated that a walkout at that time would be probable unless a new contract had been signed between the UMW and the operators.

Few guesses were hazarded last week on the chances of agreement between Lewis and the operators before mid-year deadline for the return of the mines to private control. Obviously, Lewis' position has been considerably weakened by the court's action. The strong public sentiment against uncontrolled union dictatorship, fanned by last year's strikes and reflected in last November's elections, also have helped to imperil the mine union boss' power.

The operators' position, on the other hand, appears to be somewhat stronger. They now have more public support than at any time in recent years. Congressional leadership is committed to enacting legislation to curb power of the labor unions and it is probable that such laws will be in effect by mid-year.

Southern coal operators have taken a stand against industry-wide agreements and have announced they will refuse to grant the health and welfare fund which the union won from the government. While the northern operators have been willing to negotiate, Lewis has refused to talk on a regional basis.

It is doubtful that Lewis will be able to retain all the benefits he won in the Krug-Lewis agreement in any new contract with the private operators. Retreat from a position which the miners consider already won would be decidedly embarrassing to the miners' chieftain.

If coal production continues at its present high level through the first half, stocks should be fairly comfortable by the end of June. Recent production has been close to 13 million tons a week. Consumption also is high, but some coal is being added to reserves. Rebuilding of stocks following last year's strikes, however, has been slow, as indicated by the following comparison of stocks on the eve of last year's strikes and on Feb. 1, latest date for which figures are available.

	Feb. 1, 1947	Apr. 1, 1946	Nov. 1, 1946
Total stocks (net tons)	49,114,000	58,531,000	55,076,000
Day's Supply			
Steel and rolling mills	21	38	38
By-product coke	23	36	26
Other industrials	36	48	55
Railroads	24	39	30
Electric utilities	57	95	72
Average	27	42	37

The coal industry has suffered heavily as result of the strikes of recent years. Some spokesmen for the industry estimate that the two stoppages of 1946 alone have cost the coal industry a permanent loss of 20 million tons annually. This resulted from conversions from coal to gas and oil for heating and from coal to diesel power for railroads. Public reaction to the repeated interruptions in

coal supply is expected to be felt for some time to come and will be reflected in a continuing trend toward conversion to other sources of heat and power.

Conceivably, this reaction may work heavily against Lewis and the United Mine Workers, as well as the coal industry. A few observers are predicting the mine workers union may go into a decline such as was experienced in the 1920s. When Lewis became head of the United Mine Workers in 1919, the union had more than 425,000 members, nearly 400,000 of which were dues paying. By aggressive action, the union grew in strength until 1922, succeeded in boosting miners' wages to $7.50 a day. In 1922, the union struck for 117 days; the stresses set up by this long stoppage were severe and the union began to break up. Nonunion competition rose steadily and in the later 20s the union admitted defeat and released the various districts to make whatever agreements they could at whatever terms they could obtain. Until 1933, the United Mine Workers was only a shadow organization. In that year the New Deal and National Industrial Recovery Act put the UMW back in business and its resurgence was steady and rapid. Miners' wages increased from 50 cents an hour in 1933 to $1.24 by 1945. When the government took over the mines last May, the miners were granted an increase of $1.85 a day.

Today the miners are tired of strikes, although they still will walk out if Lewis orders. The high wages have increased the cost of coal and thereby weakened its competitive position. Public reaction to Lewis' high-handed actions which have resulted in cutting off the flow of coal is strong. Much of the pressure for restrictive labor legislation arose as result of last year's coal strike. These facts lead some observers to the belief that some changes in the policies and structure of the mine workers' union are not far in the future.

Gwynne Bill Passed by House by 345 to 56 Vote

Majority by which the House passed the Gwynne bill to outlaw portal-to-portal pay suits, 345 to 56, suggests the tenor of congressional feeling on other forthcoming labor legislation. The vote was unusually nonpartisan with 229 Republicans and 116 Democrats voting for passage. Favorable action by the Senate is anticipated.

Bill provides that henceforth, the courts shall not act upon any suit for wages claimed under federal law unless the wages are claimed for activities defined as work under a collective bargaining agreement or by established custom or practice.

Bill provides that all wage claims that come under this restrictive phrasing must be taken to court within one year and claims that arose before the bill was passed must be taken to court within six months of passage. It is believed the bill as passed would bar virtually all back pay suits not yet in the courts.

Congressman Predicts Good Labor Laws Will Be Passed

Worth-while labor laws, containing badly needed reforms, will come out of this session of Congress, Congressman Fred A. Hartley Jr. (R., N. J.) predicted at a recent meeting of the New Jersey Foundrymen's Association, Newark, N. J.

Speaking on proposed federal labor legislation, he outlined various proposals under consideration by the House Labor Committee, but declared that in framing their proposals, the committee members are bearing in mind that the proposals must be of a nature sufficient to attract enough votes in Congress to over-ride a possible presidential veto once the legislation is whipped into shape.

The speaker remarked that the House Labor Committee insists that the right of free speech in labor matters be restored to management.

Charges Union Policies Prevent Free Bargaining

Industry-wide bargaining policies of the unions have just about deprived National Supply Co., Pittsburgh, of free collective bargaining, A. E. Walker, president, informs stockholders in a letter accompanying the company's annual report.

Mr. Walker declared that through industry-wide bargaining, the pattern of labor demands on the company "is fixed by negotiations to which we are not a party, in industries of which we are not a part."

"The Ambridge and Etna plants (of National Supply) are organized by the United Steelworkers of America-CIO, though these plants do not make steel; the Toledo plant by the United Automobile Workers-CIO, though it does not make automobiles; and the Torrance plant by the Oil Workers International Union-CIO, though it does not produce oil."

Present, Past and Pending

■ ELGIN WATCH DEVELOPS NEW ALLOY

ELGIN, ILL.—A new alloy for mainsprings which is expected to reduce watch repairs by 50 per cent has been developed by the Elgin National Watch Co. Known as Elgiloy, the new material combines eight elements, has potential applications in razor blades, stainless cutlery, surgical and dental instruments, gunsprings, jet propulsion gas turbine parts, automotive valve springs and electronics.

■ CONSOLIDATED STEEL TO FIGHT ANTITRUST SUIT

LOS ANGELES—Consolidated Steel Corp. has decided to defend a suit brought by the Justice Department seeking to block the proposed sale of its assets and business to Columbia Steel Co., United States Steel Corp. subsidiary, on grounds that it would violate the Sherman Antitrust Act.

■ HERBERT FARRELL SR. DIES IN FLORIDA

SANDUSKY, O.—Herbert Farrell Sr., 64, president, Farrell-Cheek Steel Co., died Mar. 3, in Palm Beach, Fla. He founded Farrell-Cheek Steel Co. in 1910.

■ UTAH TOWN BOUGHT BY U. S. STEEL

DRAGERTON, UTAH—This town of 605 modern buildings, constructed by the government during the war, to house the families of coal miners supplying fuel for the Geneva Steel plant, has been purchased by Geneva Steel Co., United States Steel Corp. subsidiary, from the War Assets Administration for $1,553,000.

■ FRACTIONAL HORSEPOWER MOTOR OUTPUT GAINS

WASHINGTON—Shipments of fractional horsepower motors in 1946 totaled 19,546,599 units, according to the Civilian Production Administration. December shipments were 2,117,943, a gain of 150 per cent over January, 1946, shipments.

High Steel Output To Ease Supply

Demand-supply balance seen in few months if current heavy production pace is held. New steel facilities projected

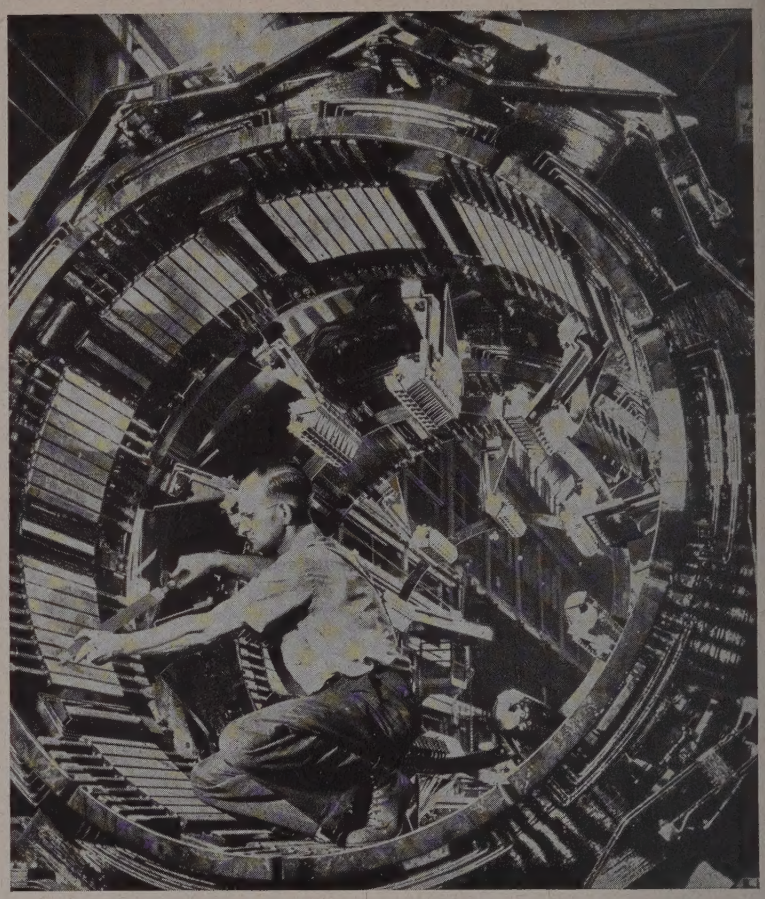
ALTHOUGH the shortage of steel products continues acute, the view is increasingly being voiced in steel industry circles that if the current high rate of production can be maintained without interruption for a few months, supplies of steel products will soon balance, if not exceed, demand.

Currently the industry is producing ingots at the rate of 1,650,000 tons weekly, equivalent to 1,155,000 tons of finished steel. In the first two months of this year ingot output was estimated around 14 million tons, equal to 9,800,000 tons of finished products and should this rate continue over the remainder of the year ingot production for 1947 will total around 85 million tons with finished steel output close to 60 million tons.

Such production would be record-breaking for peacetime. As a matter of fact, it would fall only slightly below the wartime peak output in 1944 of 89,641,000 tons of ingots and 63,250,000 tons of finished products.

Critics of the steel industry in recent months have expressed the view steelmaking capacity is not sufficient to care for the needs of consuming industry. However, steelmakers deny this, pointing out that while 1947 ingot capacity of 91,241,250 net tons is down 4,264,030 tons from the peak of 95,505,280 in 1945 when the war ended, the decline largely represents dismantling of obsolete facilities, and that actually with the efficient facilities now available being operated as close to capacity as conditions permit, capacity is as great as that during the war when considered from the practical standpoint of actual production.

This year the steel industry plans to spend $448 million for additional facilities and improvements to existing plants. These expenditures will largely be for finishing and auxiliary equipment. In 1946 the industry expended over $300 million on plant, and its yearly average of such expenditures over the past 10 years has been over $200 million.



STEEL MILL POWER: A 2500-kilowatt generator under construction at the East Pittsburgh, Pa., works of Westinghouse Electric Corp. will provide power for an unnamed steel mill. A workman is smoothing rough edges inside the generator frame preparatory to final assembly. Acme photo

Indicative of what the industry has been doing in recent months in the way of enlarging facilities to care for the expanded steel demand of the postwar period, the United States Steel Corp. in 1946 added plant facilities and betterments costing approximately $201 million, and at the beginning of this year planned similar expenditures totaling $278 million. Large additions to finishing facilities are under way by virtually all of the steel producing subsidiaries of U. S. Steel. Major projects are on the Pacific Coast, at Lorain, O., Gary, Ind., and Birmingham, Ala.

Expenditures for additions and improvements by Bethlehem Steel Corp. last year amounted to $64,431,470, and at the beginning of 1947 it had earmarked $162,500,000 for completing construction already authorized.

Youngstown Sheet & Tube Co. expended $3,700,000 on its properties in 1946 and at the beginning of this year had uncompleted appropriations of $8,500,000 for improvements and additions. In addition the directors of the company have authorized expenditures for studies and engineering for expansion of facilities in the Chicago district. These plans call for very large expenditures, and the decision as to when to contract will depend on prices of equipment and construction costs, as well as ability to secure completion within a reasonable period. Frank Purnell, president, states the directors of the company have authorized a credit agreement with five banks to borrow $20 million when needed within two years to finance the proposed expansion.

Crucible Steel Co. of America, New York, plans a 2-year expansion program involving expenditure of $30 million. New mills for large-scale production of stainless steel sheets and strips are being installed, as well as expanded production facilities for bars, rods and special steel shapes. Commenting on the program, W. P. Snyder Jr., chairman, states it is de-

(*Please turn to Page* 156)

Automotive Industry Holds First Place Among Leading Steel Users

Takes 13.1 per cent of all shipments from mills in November against 12.7 per cent in October. Other major consuming outlets hold rank unchanged. Steel warehouses get 18 per cent of all mill deliveries in first 11 months of 1946

FIRST PLACE as a consumer of finished steel was retained in November by manufacturers of automobiles, trucks, parts and accessories, latest distribution report by the American Iron & Steel Institute shows.

In November, the automotive industry, excluding tractors, received 658,953 tons of finished products, raising its receipts for the first 11 months of 1946 to 5,149,505 tons, or 11.5 per cent of the total distribution of 44,437,968 tons. Of the total November distribution of 5,000,377 tons the auto industry received 13.1 per cent, compared with 12.7 per cent in October.

Compared with October, rankings of leading consumers remained unchanged through November. For the month, construction and maintenance retained second place with 461,196 tons; rail transportation was third with 386,326 tons; and the container industry continued in fourth place with 363,962 tons. However, for the first 11 months, the container industry placed third with total receipts of 3,721,505 tons and rail transportation was fourth with 3,384,378 tons. Construction and maintenance continued in second place, with receipts totaling 4,135,700 tons.

Steel warehouses received less tonnage in November than in October but inasmuch as total distribution in the shorter month of November also was less than in October the percentage allotted to warehouses was unchanged, 16.2 per cent. The November receipts of warehouses were 810,221 tons, compared with 850,063 in October. Total amount received by warehouses in the first 11 months was 8,005,380 tons, 18 per cent of all finished steel.

Rankings of consuming industries in the first 11 months remained unchanged from a month earlier. They are: 1. Automotive, excluding tractors; 2. construction and maintenance; 3. containers; 4. rail transportation; 5. machinery, industrial equipment, tools; 6. contractors' products; 7. domestic and commercial appliances; 8. appliances, utensils and cutlery; 9. electrical machinery and equipment; 10. agricultural; 11. shipbuilding; 12. oil and gas drilling; 13. mining, quarrying and lumbering; 14. ordnance and other military; and 15. aircraft. These 15 classifications exclude warehouses, converters and processors and exports as not being end consumers.

Steel Distribution
Eleven Months, 1946

(Leading products of all grades, including alloy and stainless)

Market Classification	Net Total All Products (in net tons)
Converting and Processing	3,700,470
Jobbers, Dealers, Distributors	8,005,380
Construction, Maintenance	4,135,700
Contractors' Products	1,429,849
Automotive, excl. tractors	5,149,505
Rail Transportation	3,384,378
Shipbuilding	262,314
Aircraft	21,268
Oil, Gas Drilling	223,048
Mining, Quarrying, Lumbering	167,333
Agricultural	920,523
Machinery, Industrial Equip., Tools	2,095,288
Elect. Machinery, Equipment	1,028,606
Appliances, Utensils, Cutlery	1,096,701
Other Domestic, Commercial Appliances	1,238,288
Containers	3,721,505
Ordnance, Other Military	27,527
Unclassified	5,255,865
Export	2,574,420
Total	44,437,968

Steel Production On Coast Well Above Prewar Mark

Pacific Coast steel production has increased three and one-half times over the prewar figure, according to Harvey Hewitt, vice president in charge of sales for Bethlehem Pacific Coast Steel Corp.

Before the war, the coast steel industry produced one million tons of ingots a year. Present production is 3.5 million tons. The U. S. Steel mill at Geneva, Utah, and the Kaiser mill at Fontana, Calif., account for the large increase.

Rapid expansion of Pacific Coast industry will be able to absorb the greatly enlarged steel output, says Mr. Hewitt.

Distribution of Steel Products—November, 1946

(In net tons of leading products of all grades of steel, including alloy and stainless)

Market Classification	Shapes	Plates	Hot Rolled Bars	Cold Finished Bars	Seamless Tubing	Drawn Wire	Hot Rolled Sheets	Cold Rolled Sheets	Coated Sheets	Hot Rolled Strip	Cold Rolled Strip	Total (All Products)
Converting and Processing	4,986	43,894	195,849	13,101	11,281	72,086	63,125	2,166	1,320	31,839	10,534	811,907
Jobbers, Dealers, Distributors	60,459	68,461	88,934	47,433	80,539	15,628	68,925	33,315	34,666	10,312	3,496	810,221
Construction, Maintenance	148,698	102,634	26,990	203	21,125	605	24,820	3,563	15,953	5,893	2,022	461,196
Contractors' Products	993	11,612	12,562	688	5,065	2,506	53,232	30,991	30,963	7,897	5,169	177,307
Automotive, excl. Tractors	3,750	25,707	134,604	24,369	2,425	18,670	156,619	189,097	8,980	45,310	23,137	658,953
Rail Transportation	46,354	55,205	33,518	476	1,030	326	22,556	1,805	2,582	3,066	355	386,326
Shipbuilding	4,030	20,147	1,460	182	89	66	1,469	441	702	151	7	29,220
Aircraft		95	178	644	117	2	152	166	138	241	170	2,200
Oil, Gas Drilling	2,404	5,401	7,165	591	4,653	7	874	.....	58	61	3	25,914
Mining, Quarrying, Lumbering	1,015	3,873	5,102	312	51	185	1,457	288	91	128	18	19,396
Agricultural	4,294	6,364	37,017	5,122	102	3,259	10,449	3,720	8,403	8,466	366	91,989
Machinery, Industrial Equipment, Tools	20,324	58,791	62,279	25,873	8,845	7,821	27,541	4,393	1,914	11,291	5,157	259,031
Elec. Mach., Equipment	3,538	9,114	10,184	3,853	1,895	3,641	24,360	8,339	2,690	7,221	4,885	127,610
Appliances, Utensils, Cutlery	111	1,040	2,139	3,306	306	4,230	22,150	46,001	8,268	2,662	6,598	121,963
Other Domestic, Commercial Equipment	1,472	8,519	7,850	5,903	151	23,839	23,557	33,405	4,254	7,640	13,774	141,751
Containers	40	13,772	2,031	.....	745	8,302	59,621	23,529	4,705	12,505	10,320	363,962
Ordnance, other military		108	270	234	2	30	59	27	.....	.....	8	850
Unclassified	25,170	24,598	100,448	13,053	38,132	41,356	47,558	48,631	7,258	4,395	44,614	604,281
Export	28,081	32,649	23,034	3,133	17,793	6,773	19,958	8,972	5,851	5,799	1,178	310,421
Total	355,719	491,984	751,614	148,476	194,346	209,332	629,482	438,849	138,796	164,877	131,811	5,404,498
*Less shipment to members of industry for conversion	.....	26,186	87,126	255	10,835	12,937	37,694	107	172	21,301	3,267	404,121
Net Total	355,719	465,798	664,488	148,221	183,511	196,395	591,788	438,742	138,624	143,576	128,544	5,000,377

* All of these shipments were made to the group classified as "Converting and Processing."

Some Hope Held Out for Revival Of Ship Program

House committee expected to push for revival of shelved postwar building plans with industry's survival threatened

LAST WEEK brought a ray of hope for shipbuilders now completing the last few vessels left over from the huge war shipbuilding program and who are faced with disintegration of their business unless they get some help promptly.

"Unless we get some new business," one of them told STEEL last week, "we will be unable to keep the art of shipbuilding alive in this country."

The help that is in sight will come from the House Committee on Merchant Marine and Fisheries which concluded hearings on Feb. 25 on a bill to extend the authority of the Coast Guard to waive the provisions of a number of laws governing operation and equipping of ships. The Coast Guard was authorized, in the interest of mobilizing all possible shipping during the war, to waive application of these laws when, in its judgment, such action would not result in operation of unsafe vessels.

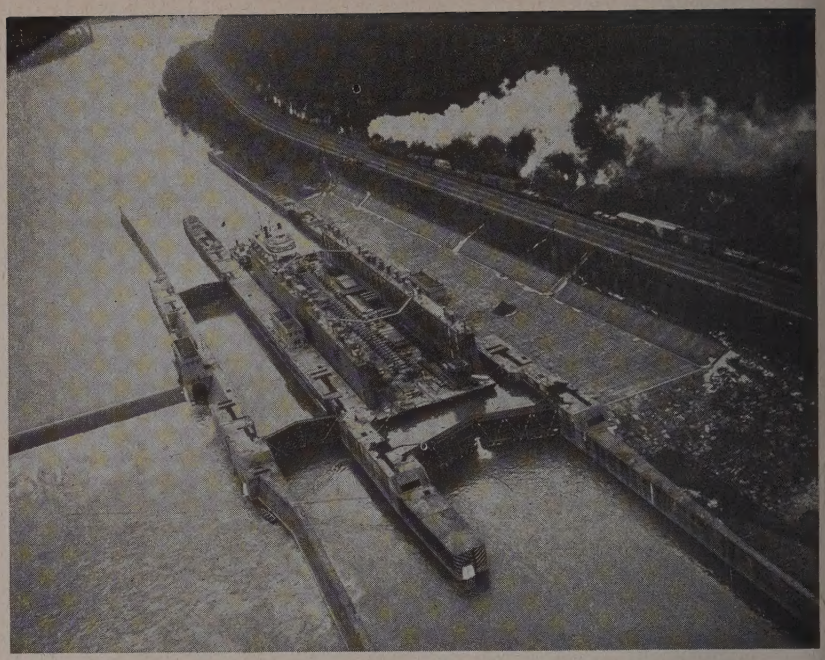
On the basis of testimony developed during the hearings, the committee has decided to make two recommendations to the House: 1—That, because of the present critical shortage of passenger and combination passenger and cargo vessels, the bill to extend the waiver authority be extended, and 2—that action be taken to get the postwar shipbuilding program started without delay.

Wants Program Re-activated

The committee is expected to ask particularly for action authorizing execution of the program laid down in 1944 and 1945 at the instance of the late President Roosevelt. This included some large passenger ships—3 for the Mediterranean, 2 for the South American, 2 for the Pacific and 1 for the North Atlantic trades. The Maritime Commission proceeded to the stage of actually letting contracts for some of these vessels when Reconversion Director John Steelman last summer ordered the whole program suspended. He gave two reasons—one that reduction in government spending was in order and the other that materials that would be required in building the ships was badly needed for the veterans housing program.

The House committee, which expects to get a ruling quickly for presenting its recommendations in the well of the House, also is expected to make a recommendation that the Maritime Commission program laid down in 1937 but disrupted by the war be readopted in some form. The program adopted in 1937 called for construction of 50 ships a year over a 10-year period. The committee is expected to recommend a program calling for construction of a large number of smaller passenger and combination passenger and cargo vessels per year over a period still to be determined.

Unless Congress promptly adopts a policy of this kind, shipbuilding in this country will be in a bad way by the middle of 1947 and will be nonexistent by the end of the year, as the small number of ships still under construction rapidly are being launched and fitted.



Enroute from Pittsburgh to the Gulf of Mexico, the AFDL-47, huge floating drydock, is shown here being maneuvered into the Dashields Locks in the Ohio river below Sewickley, Pa. Built by the Dravo Corp., the craft is 448 ft long, 97 ft wide and 45 ft high. Unit is self-contained, having its own water distillation plant, diesel electric generators for lights and power

Steel Company Protests Illinois Freight Rates

The Great Lakes Steel Corp., with plants in Detroit, and Terre Haute, Ind., has filed complaint with the Interstate Commerce Commission alleging that freight rates on iron and steel articles within Illinois are preferential to Illinois producers and discriminatory against Detroit and Terre Haute.

The Illinois Manufacturers' Association has filed with the ICC petition of intervention, stating among other things, that the underlying basis of freight rates on iron and steel articles within Illinois has been in effect for more than 20 years and is founded on reasonable groups of origin and destination; and that any marked change in the underlying basis of making rates on iron and steel articles in the state would adversely affect the members of the association.

ICC Suspends Lower Steel Rate from Geneva to Coast

The Interstate Commerce Commission on Mar. 11 will hear oral arguments on Henry Kaiser's protest against the lower rail freight rate on steel from Geneva, Utah, to West Coast points which was scheduled to go into effect Mar. 1 but which Feb. 28 was suspended for a month by the ICC.

The suspension of the new tariff, which reduced rates 31 per cent on iron and steel shipments from Geneva, followed a petition by Mr. Kaiser and several leading eastern steel producing interests protesting that the new rate was discriminatory in favor of U. S. Steel Corp. which operates the Geneva steelworks.

The proposed rate reduction would lower the cost of shipping 100 pounds of steel from the Geneva-Salt Lake City area to Portland, San Francisco and Los Angeles from the present 70 cent rate to 48 cents. From Geneva to Seattle and Tacoma, Wash., the rate would drop from 76 to 54 cents.

RFC Seen Out of Metal Business By End of June

Expects to dispose of remaining inventory, except tin, by transfer to Bureau of Federal Supply or private sales

RECONSTRUCTION Finance Corp. will be virtually out of the metals business by June 30, 1947. By that time it will have disposed of most of its remaining inventory in two ways—by transferring it to the Bureau of Federal Supply, as stockpiling agent for the Army-Navy Munitions Board, or by sales to private industry in order to relieve deficiencies which harass civilian industry.

The single exception will be tin. Under directive of the Director of War Mobilization & Reconversion it will continue to bring in Bolivian tin concentrates and convert them into metallic tin at the Texas City, Tex., smelter.

On the basis of what various congressmen have said on the subject, the Reconversion office has good reason for believing that it is the will of Congress that the government-owned tin smelter be continued in operation until Congress determines its ultimate disposition. That, it is expected, will take the form of the sale of the smelter to private operators who would require a subsidy to enable them to meet foreign tin competition. Informed estimates are that this subsidy, on the basis of present costs, would have to be between 3 and 4 cents per pound of tin. Start on the necessary legislation is expected shortly.

The RFC has decided to shut down its smelter in Cuba which has been producing about 25 million pounds of nickel oxide annually for the alloy steel industry in the United States. A deal involving disposition of this smelter to the Nicaro Nickel Co. now is being discussed. Nicaro, owned by the Freeport Sulphur Co., has been operating the smelter as agent for the RFC, on nearby ores owned by Nicaro.

Through its subsidiary, the Metals Reserve Co., since liquidated and merged into the RFC, the agency embarked in the metal business in June, 1940, when it started to buy tin and manganese ore for the defense program. Later the program was expanded to include some 50 metals and minerals, and altogether to date the RFC has spent a little more than $3 billion for such commodities. It accumulated large stocks which were of vast assistance in relieving shortages that threatened to hamstring reconversion of war industries to produce civilian goods.

As to the Army-Navy Munitions Board stockpiles, the RFC has turned over metals and minerals valued at about $200 million and this amount will be increased as fast as the Bureau of Federal Supply arranges for the necessary storage facilities.

The RFC stopped its buying program in the fall of 1946. It will continue to receive deliveries on outstanding commitments for another two years. These unfilled contracts involve principally copper, zinc and lead but the amounts still due are relatively small.

Principal items in the RFC metals and minerals inventory as of Jan. 31, 1947, were:

Copper	62,313 short tons
Metallurgical chrome ore and concentrates	206,476 long tons
Manganese ore	769,918 long tons
Tungsten	1,914,170 pounds
Vanadium	996,654 pounds
Antimony	4,339 short tons
Cadmium	588,192 pounds
Lead	40,697 short tons
Tin	47,740 long tons
Zinc	473,423 short tons

In addition, the inventory contains substantial quantities of a host of other metals and minerals—as aluminum, beryl, asbestos, barytes, cobalt, nickel, corundum, industrial diamonds, ferroalloys, fluorspar, graphite, magnesium, mercury, metals of the platinum family, etc.

Production of Pig Iron Rises During January

Output for month largest since March, 1945; industry operating at 90.8 per cent of capacity. Recovered from coal strike

PIG IRON production increased sharply in January, recovering fully from effects of the coal miners' strike in December and establishing a new high since March, 1945, according to the American Iron & Steel Institute.

The industry operated at 90.8 per cent of capacity in January, based on a revised annual figure of 65,709,200 tons compared with rated capacity of 67,340,590 in 1946. This compared with 69.9 per cent of capacity in December and only 46.2 per cent in January, 1946, when the strike of steelworkers was underway.

Production of pig iron totaled 5,071,369 tons in January, including 56,573 tons of ferromanganese and spiegeleisen, compared with 3,992,165 tons in December and 2,644,552 produced in January, 1946.

Canadian Steel Production Cut Slightly in December

Canadian steelmakers in December produced 235,159 net tons of carbon steel and shipped 221,341 net tons, while alloy steel produced amounted to 8632 tons with 7640 tons shipped. In November 238,868 tons of carbon steel were made and 238,778 tons shipped, with 7376 tons of alloy steel produced and 7769 tons shipped.

For 1946 Canadian steel mills produced 2,300,088 net tons of carbon steel and shipped 2,298,986 net tons. Alloy steel output was 75,442 tons with shipments of 73,180 tons.

Blast Furnace Capacity and Production—Net Tons — JANUARY - 1947 (Month)

	Number of companies	Annual blast furnace capacity	Production: Pig Iron — Current month	Pig Iron — Year to date	Ferro Manganese and Spiegel — Current Month	Ferro Manganese and Spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
Distribution by Districts:										
Eastern	11	12,551,280	937,150		26,326		963,476		90.3	
Pittsburgh-Youngstown	16	25,042,040	1,980,342		19,620		1,999,962		94.0	
Cleveland-Detroit	6	6,557,500	522,248		-		522,248		93.7	
Chicago	7	14,097,710	1,051,846		-		1,051,846		87.8	
Southern	8	4,924,670	353,904		9,644		363,548		86.9	
Western	4	2,536,000	169,306		983		170,289		79.0	
Total	36	65,709,200	5,014,796		56,573		5,071,369		90.8	

Foundries Increasing Capacity

Industry sees five years of high operations. Sixty-five per cent of castings shops to buy new equipment this year

Highly-mechanized section of the molding floor at the Crane Co., Chicago, foundry is shown above. Molding machines are shown at left rear. Molds are poured on the stationary roller conveyors, then pushed off onto the power-driven mold conveyor shown in foreground. The two workmen are returning empty flasks to the molding machines

FOUNDRY capacity, substantially augmented during the war and early postwar era, will be further increased by more than 16 per cent during 1947. This means heavy purchases of foundry equipment, with 65 per cent of all foundries planning to buy equipment this year. The expansion is prompted by expectations that foundry operations during the next five years will average better than 85 per cent of capacity.

These are the highlights of an extensive survey made by *The Foundry*, Cleveland. Study is based on reports from more than 1500 foundries throughout the United States and Canada.

Since V-J Day, foundries have increased capacity by 17 per cent (increases are gross and do not take into consideration foundries which reduced their capacity or went out of business).

During the war, more than $325 million was invested in foundry expansion, the major portion of which was for steel foundries and light metal plants. Part of this capacity was "washed out" when the war ended and the need for the war-born facilities ended. Some of it was never used and part of it was employed only for a short time. Retrenchment has been greatest in the light metals and steel foundry capacity and least in the gray iron capacity.

Nonferrous Capacity Raised 22%

Increases made since V-J Day and planned for this year are largest in the nonferrous foundry field and in gray iron. Nonferrous foundry capacity has been increased 22.1 per cent since the war ended and an additional increase of 18.1 per cent is planned for this year. Gray iron capacity has increased 16.8 per cent since V-J Day and another 17.4 per cent will be added in 1947.

Postwar expansion has been more marked among the smaller foundries than among the larger units. This is a natural development in light of the big wartime growth of large foundries.

Nearly 65 per cent of all foundries have on order or expect to buy new equipment this year. Projected buying indicates the trend toward further mechanization is more pronounced among the smaller shops.

Equipment for the preparation and molding of sand appears to elicit the most interest among prospective buyers. A sizable portion of plants plan to buy materials handling facilities, including cranes, hoists, conveyors, industrial trucks and cupola chargers. Various types of cleaning equipment, including tumbling barrels and airless, hydraulic and pneumatic blast units, are sought by 12 per cent of foundries in the equipment market. Nearly 8 per cent will buy grinders, and about the same number will purchase air compressors.

Only about 17 per cent of foundries indicate they have bought surplus government foundry equipment. The majority of these were large foundries which in many cases have acquired complete government-financed units.

Summarizing its findings, *The Foundry* says: "Modernization of foundries received considerable impetus during the war and in the period since the close of hostilities. This development in the production of castings has resulted chiefly from tremendous pressure for increased production of castings in the face of a limited supply of manpower. The trend undoubtedly will continue in the months immediately ahead. . .

"Difficulties experienced by many foundries during the war in preventing workers from drifting to other industries emphasized the necessity of not only substituting mechanized equipment wherever possible for nonavailable skilled employees, but also of providing working conditions that would prove more attractive than in the past. Many plants have demonstrated that the saying, 'The foundry is a good place to work,' is not an empty slogan but can be effectively realized. The nature of casting operations requires the presence of heat, with its accompanying dust and smoke, plus the movement of heavy materials. However, the effect on the worker of these circumstances can be minimized if the correct type of equipment is utilized."

How far the foundries are going in this direction is indicated by the fact that 15.4 per cent are planning to install dust control systems; 43.1 per cent now have such systems. Mechanized mold handling equipment will be installed by 17.2 per cent of foundries; 12.2 per cent now have this equipment. Mechanized sand handling equipment is being purchased by 18.1 per cent of all casting shops; 16.4 per cent now have such equipment.

In making the study, *The Foundry* compiled an inventory of the equipment now in operation in the 5500 foundries in the United States and Canada.

This shows the foundry industry has available nearly 23,000 melting furnaces. Of these, 5235 are cupolas, 299 air furnaces, 1345 electric furnaces, 52 converters, 155 open hearths, 14,413 crucible furnaces and 1231 noncrucibles.

Inventory of materials handling equipment shows 1290 cupola chargers, 7330 roller conveyors, 3437 monorail conveyors, 665 power mold conveyors, 3140 belt conveyors, 13,556 hand hoists, 18,942 power hoists, 11,646 cranes, 2321 electric trucks, 2872 gasoline trucks, and 1443 lifting magnets.

Equipment for the preparation and

molding of sand has figured prominently in modernization of casting plants. The industry now has 5441 mullers, 5654 mixers and cutters, 62,843 molding machines, 5481 core blowers, 13,957 core ovens and 1619 magnetic separators.

In cleaning and miscellaneous equipment, the inventory shows 27,682 grinders, 12,544 tumbling barrels, 2609 airless blast units, 3457 pneumatic blast units, 689 portable shakeouts, 2019 stationary shakeouts, 6954 dust arrestors, 3993 heat treating furnaces, 8913 air compressors, and 263 x-ray machines.

U. S. Sues 26 Steel Firms To Collect Patent Royalties

Twenty-six steel producers were named in a suit filed in Cleveland last week by the attorney general demanding payment to the United States Treasury of money claimed due over the last two years for royalties to Cold Metal Process Co., Youngstown.

The original suit, of which the current litigation is an outgrowth, was filed in 1943 by the government against the Cold Metal Process Co., charging that company with obtaining its patents by fraud. Royalties paid on these allegedly fraudulent patents were impounded by the government.

In 1945 Judge Shackleford Miller of Louisville ruled in favor of the company, with the government appealing. The case is now pending in the Sixth Circuit Court of Appeals, Cincinnati.

Payment of royalties by the licensees to the government stopped, it was charged, when the Miller decision was handed down.

International Harvester Sells Ore Firm to Cleveland-Cliffs

International Harvester Co., Chicago, has sold the plant and equipment of its Wisconsin Steel ore mines, on the Mesabi range near Hibbing, Minn., to Cleveland-Cliffs Iron Co., Cleveland, and is withdrawing from operation of iron ore mines inasmuch as it is going to buy its ore on the open market.

International will sub-lease to Cleveland-Cliffs the Agnew, Hawkins and Sargent mines, which it has operated under leaseholds for many years. This transaction gives the Cleveland company a total of six ore mines in the Mesabi region. The Wisconsin Steel ore mines have not operated since Feb. 8, 1946, because of a strike by United Steel Workers-CIO, but Cleveland-Cliffs officials stated they expected the workers to return very shortly.

Harry O. Bercher, general manager of the Steel Division of International Harvester, said his company was withdrawing from mining operations because of the long strike, because of the need for more ore than Wisconsin's facilities could supply even when in full operation and because the company's leases on the Mesabi range expire within a relatively short time.

Allegheny Ludlum Converts To Oil Wherever Possible

Allegheny Ludlum Steel Corp., Pittsburgh, is making a complete survey of its gas-fueled equipment with a view to converting all possible facilities from gas to oil, thereby avoiding future shutdowns caused by gas shortages during cold weather.

The first step of the conversion program is under way at the corporation's West Leechburg, Pa., plant where the slab re-heating furnaces are being changed over from gas to oil, permitting operation of the hot mills without regard to weather conditions. Cold weather and resultant shortages of natural gas supplies have caused curtailment of production at the corporation's West Leechburg and Brackenridge plants, totaling, in the case of some departments, as much as four weeks since the first of the year. At times as many as 6000 employees have been affected with all production stopped at West Leechburg and all gas-fueled operations closed at Brackenridge.

Sales of Surplus Tools in Cleveland Rise Sharply

Sales of government-owned machine tools and metalworking equipment in the Cleveland region for January and February of this year are more than double the figure for the first two months of the last quarter of 1946, the Cleveland office of War Assets Administration announced last week. Based on acquisition cost, $3,463,932 of equipment was sold compared to $1,390,687 for October and November. Current rate of recovery is 30 per cent.

WAA gives as explanation of the upsurge in sales its new disposal policies.

Supercharger Production Spurred by Pesco Products

Completion of modern research laboratories and addition of machine tool equipment to facilitate production of superchargers in the Pesco Products Division, Borg-Warner Corp., in Cleveland, was announced last week by C. S. Davis, president.

The Pesco engineering staff is concentrating on developing superchargers for heavy duty gasoline engines for trucks, busses and other industrial uses.

Tool Builder Plans Greater Diversification

Warner & Swasey to remain primarily a tool builder, but will make other products to use war-extended capacity

WHILE destined to continue primarily a builder of machine tools, Warner & Swasey Co., Cleveland, also is "definitely committed to a policy of product diversification in the interest of long-term possibilities," the company announced last week in its annual report.

"With a plant greatly enlarged by war demand, we shall proceed with the production of other types of machinery."

New fields which were invaded by the company within the last year were for road construction machinery and textile machinery. The company's Gradall, a multipurpose earthmover, and its Aveco knitting machine and pin drafting machine, for use by textile manufacturers, have met with widespread acceptance.

Additional textile machines are in design or testing stages, it was reported by the company.

During the year, the company began production of three new machine tools —a multiple spindle automatic, an electrocycle turret lathe for machining nonferrous metals and a tapping and threading machine. In addition, redesign of the company's nine standard turret lathe models was begun, and it is expected the company will introduce some of these new designs at the National Machine Tool Show in Chicago, Sept. 17-26.

The company had net operating loss for 1946 of $162,109. After tax carryback of $130,000, the loss was reduced to $32,109. During the year sales totaled $15,444,569 compared with $28,305,442 in 1945, when net earnings were $1,187,285.

Factors contributing to the loss in 1946, according to Charles J. Stilwell, president, were strikes in plants of suppliers, which forced Warner & Swasey to close down for five weeks; overall reduction in machine tool sales, largely resulting from government sale in 1946 of an estimated $46 million of Warner & Swasey turret lathes from war surplus (as compared to the company's 1946 machine tool sales of $13,631,751); and unusual expenses incurred in research and development of new products.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Developments at Moscow conference expected to exert tremendous influence on government appropriations, tax rates and reduction of national debt in fiscal year 1948. Extent of emphasis on military preparedness hinges on outcome of meeting

MOSCOW, where the conference of Foreign Ministers scheduled for March 10 now is in the organization stage, temporarily rates as the world's leading news center as far as informed Washington is concerned. What transpires at this meeting will exert considerable influence on the cost of government, tax rates and reduction of the national debt in the fiscal year 1948 and the years to come.

The big question is: Will the new secretary of state, George C. Marshall, be able to reach an accord with Russia which will reduce the present emphasis on the need for military preparedness in the United States?

The answer, as it will begin to be revealed late in March, will have a lot to do with the appropriations Congress votes for the War and Navy Departments for fiscal 1948. Largely, it is the uncertainty as to how much of an insurance bill we must incur under the head of military preparedness that accounted for the difference of opinion in the House and Senate as to whether the President's $37.5 billion budget should be cut by $6 billion or $4.5 billion.

In the meantime there is beginning to be some fear in Congress that, unless the international situation becomes less menacing, the $11.2 billion asked by the President for the Army and Navy may not be sufficient. Much of this uncertainty will be cleared away if the Moscow meeting reveals a more co-operative attitude on the part of Russia.

President's Budget Questioned

Another question that is beginning to perplex members of the House appropriations subcommittees in connection with requests for fiscal 1948 is: How sound, from the standpoint of national interest, are amounts called for in the President's budget? A good many items could be mentioned by way of illustration; the request for the Office of Naval Research, for instance. This request is of special interest to business and industry because the ONR conducts a vast program of fundamental research aimed at uncovering new scientific information for use for many civilian in addition to military purposes.

Whereas the Office of Naval Research received an appropriation of $45 million for the fiscal year 1947, the request for fiscal 1948 is $34.4 million—a reduction of approximately 25 per cent. What would such a cut mean? If it is made, it is a certainty that the ONR's scientific research program will have to be reduced substantially.

There are two reasons for this expectation. The first is that the President's budget also asked for reduced appropriations for the various Navy bureaus and, if these cuts are approved, the bureaus would have to include in their economies a reduced volume of patronage of the Navy's existing research and development establishments during fiscal 1948. One of these, for example, is the huge Naval Research Laboratory at Anacostia. If the bureau cuts cited in the President's budget are approved by Congress, the Office of Naval Research would have to earmark about twice as much money as it now furnishes for the Naval Research Laboratory.

The alternative, of course, would be to close down some of the scores of well equipped buildings at this laboratory, and dismiss many of the trained research workers there. Such a course would be resorted to by the Navy only as a last choice. The Naval Research Laboratory, incidentally, is doing a large amount of work of prime value to industry, as its research in foundry sand and in melting and casting techniques.

Another reason why the proposed reduction in appropriation for the Office of Naval Research would substantially reduce the future scientific research program is the fact that the law which gave this office a congressional charter provides that funds appropriated to it may be spent over a period of five years instead of the customary three. Faced with a cut of 25 per cent upon going into fiscal 1948, ONR naturally would have to reduce commitments in connection with many of its long-term programs. It certainly would not be warranted in assuming that the appropriations for 1949, 1950 and so on would be larger.

The ONR contracts, aside from those placed with Navy establishments, have been placed chiefly with colleges and universities. As a result, these institutions have been able to point up their basic scientific research work and install a lot of specialized equipment. One of the most important by-products is the training of new research workers. It is estimated that among those working under the ONR contracts are some 2000 graduate students who are using this work to earn their doctors' degrees.

The contracts cover a widely varied assortment of basic research objectives. A number of them, for example, are aimed at discovering new information about behavior of metals and alloys under extreme temperatures. This program is of importance in view of the need for heat resistant materials for jet planes, rockets, etc. It is likewise important in connection with many civilian requirements. The heat resistant program is only one of many equally important research programs being carried on under ONR long-term contracts.

Thus it is seen that the job of reducing government expenditures is far from being a simple one, it is unlikely that Congressional leaders will be able to keep all their promises under the head of economizing. Take Commerce Department, for example, whose appropriation Chairman Taber, House Appropriations Committee, threatens to reduce from $261 million to $161 million. Offhand, this threat does not make sense to Washington observers for the vital aviation-aid program of the Civil Aeronautics Administration will come to $160 million alone without making allowance for any of the other Commerce activities.

SAFER IN ARSENALS

It was safer during the war to work in Army Ordnance plants than in the Pentagon Building, an Ordnance Department study reveals.

In the huge War Department headquarters building the accident rate was six for each million man-hours worked. In Ordnance arsenals the accident rate was just about half that figure.

OPA Personnel Finding Jobs

OPA PERSONNEL officers charged with the responsibility of helping discharged employees of this dwindling agency find other employment are amazed over the way the particular problem of "frictional unemployment" is taking care of itself. Between Nov. 20 and Dec. 31 the OPA sent dismissal notices to 15,000 employees in field offices scattered over the United States and its territories. The latest check reveals that 91 per cent of

these dismissed employees have found jobs in private industry, and no longer are in need of assistance. These people had close relations with many business firms during their employment by the OPA and in most cases they were offered employment as soon as it became known their services were available. OPA officials still on the job take this record as an indication that, despite the vast amount of criticism leveled at the OPA, that agency also had a lot of friends and enjoyed considerable respect and confidence.

Looking Beyond 1950

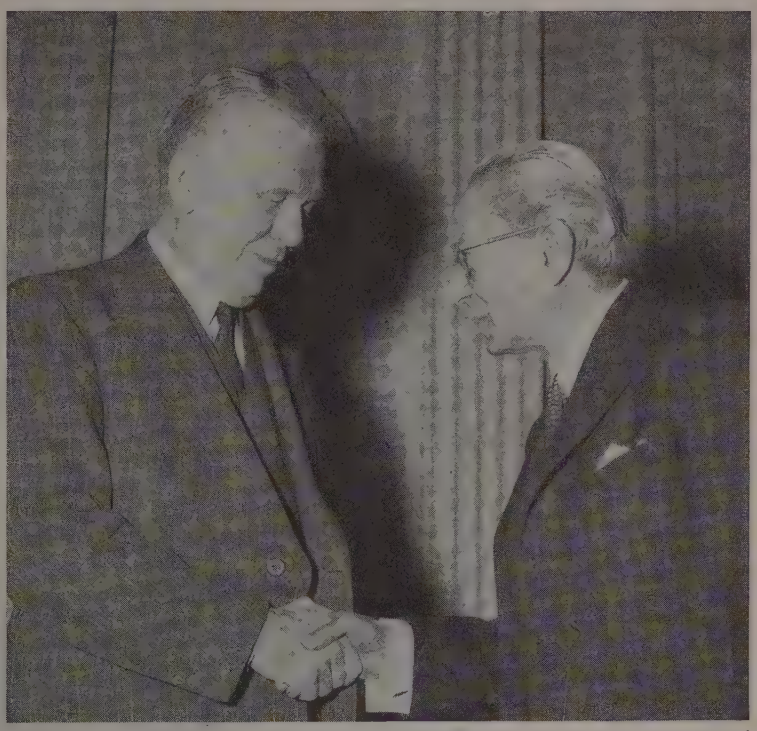
ONE OF THE PROBLEMS with which the Republican leadership is deeply concerned is that of forestalling, if possible, or minimizing, the business depression which, on the basis of what has happened after all major wars of the past, is expected sometime in the 1950's as the aftermath of World War II.

Senator Taft, as chairman of the Senate Majority Policy Committee, has deferred organization of the Joint Committee on the Economic Report pending selection of a staff to steer such a study for this committee. Many men have been considered and screened out; none of them so far have made the grade.

Senator Taft is convinced that, with adequate assistance, the Joint Committee on the Economic Report can do a great deal to prevent a severe depression in the 1950's, and to allay the cyclical depressions which in times past have furnished the principal basis for criticizing our economy. The aim is to safeguard the future of our private enterprise system by relieving it of the disease of periodic tailspins. It will take a top-notch economist to boss this show, in the opinion of Senator Taft—and so far no such man has become available for the post.

Full employment, of course, is the ideal remedy seen by Senator Taft and other thoughtful legislators—and this subject also is receiving a lot of study in other key places in Washington—as the Labor Department, the White House, the President's Council of Economic Advisers, etc.

Some thought-provoking conclusions under this heading have been reached by the Bureau of Labor Statistics which estimates that the working force will have grown to 62.5 millions in 1950 compared with 55 millions in 1940. To keep 7 million additional workers busy, and assuming that man-hour productivity will keep on increasing in the future as in the past, many industries will have to increase their production by as much as 90 per cent. To keep 62.5 millions of workers busy in 1950, the bureau estimates, and assuming that the work-week will consist of 40 hours, "a minimum level of steel production exceeding the wartime peak and exceeding present ingot capacity by 5 million tons" will be needed.



INDIAN AMBASSADOR: Secretary of State George C. Marshall, left, greets Asaf Ali, India's first ambassador to the United States. NEA photo

Especially interesting is the finding that a family with $2000 income was able to save 20 per cent in 1901, 14 per cent in 1917-19, 4 per cent in 1935-36 and 3.5 per cent in 1941. The question is: Are we wise in encouraging policies that take the emphasis on saving and place it instead on spending?

List Surplus Abroad

A LONG LIST of surplus United States property abroad which may now be brought back to the United States has been published by the State Department. The list includes products which had been released to the foreign liquidation commissioner for disposal abroad but which are needed to relieve shortages of these goods in this country. Arrangements for purchase of these goods may be made through the foreign liquidation commissioner, care State Department, Washington 25, D. C.

The goods are listed under these classifications: Automotive and transportation equipment; building materials and equipment; construction machinery and equipment; drugs and chemicals; electrical equipment and supplies; machinery and allied equipment; metals and metal products; paper and paper products; professional and scientific apparatus; textiles and textile products; miscellaneous.

Special Advisory Board

SO THAT ADMINISTRATION officials may arrange for quick consultation with informed American businessmen on problems arising in connection with United States commercial interests abroad, the State Department has appointed a special business advisory committee. Relations with this committee will be handled through the State Department's Board of Foreign Service headed by John E. Peurifoy, acting assistant secretary of state.

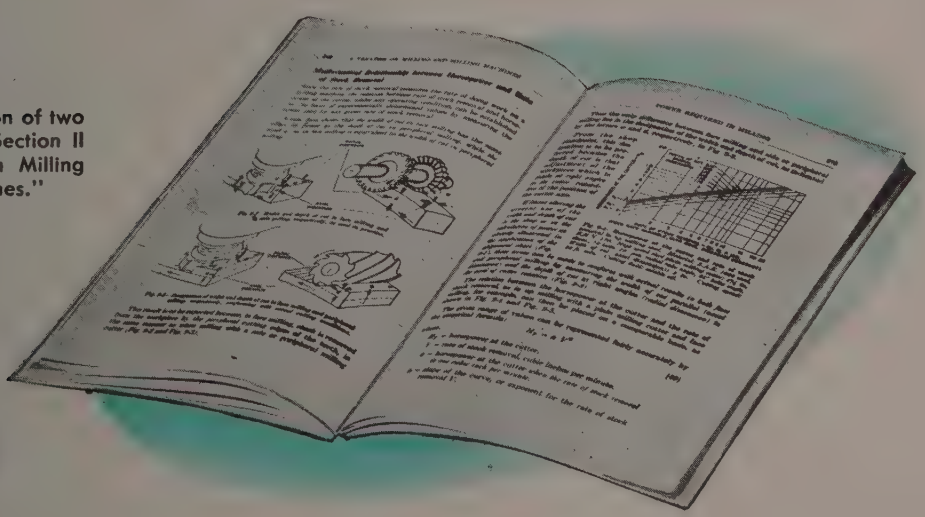
Other members are Spruille Braden, assistant secretary of state, William Benton, assistant secretary of state, and Selden Chapin, director-general of the Foreign Service unit. Others on the board are David Morse, assistant secretary of labor, Leslie A. Wheeler, director of the Office of Foreign Agricultural Relations, Department of Agriculture, and George L. Bell, associate director of the Office of International Trade, Department of Commerce.

Milling and Milling Machines"

IS NOW AVAILABLE

Section II of "A Treatise on Milling and Milling Machines" deals with such subjects as chip formation, surface finish, cutters, cutting fluids, power required in milling, and other important matters relative to milling processes. ¶ This section is 6" x 9", the same size as Section I, and contains 147 pages profusely illustrated with photographs and drawings. ¶ Section II is another outstanding contribution to the advancement of milling procedure, and should be in the possession of everyone interested in modern milling practice, from plant executives to students and apprentices. ¶ The Cincinnati Milling engineers who collaborated in the preparation of this work, have at their disposal more than sixty years' experience in the design and construction of milling machines as well as all phases of milling procedure. You'll find Section II a valuable addition to your technical library. Send for your copy of this book today. The price is only one dollar postpaid anywhere.

This is an illustration of two typical pages of Section II of "A Treatise on Milling and Milling Machines."



CINCINNATI

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Some Projected Plants Deferred On West Coast

High cost of building causes major manufacturing interests to shelve plans pending more favorable conditions

SAN FRANCISCO

HIGH COST of building has led several major firms to shelve temporarily their plans to build or expand plants in northern California.

General Electric Co. bought a 57 acre factory site in San Jose in 1944 with the intention of building there at war's end, but has yet to break ground for the project. The company awaits a softening of building costs.

Gar Wood Industries deferred for at least a year an estimated $500,000 San Francisco plant expansion program "because of the high costs of materials and labor," says an official.

L. A. Young Spring & Wire Co., Detroit, has called off its plans for a 50,000 sq ft plant in Oakland for the same reason.

Soaring construction costs were also the major factor in the postponement of San Francisco expansion plans of Schenley Distilleries Inc. Plans were put on the shelf "until more favorable conditions exist."

Southern Pacific Railroad has stopped all construction except maintenance work. High costs played a big part in the decision, the company reports.

Bailey Bros., Belmont, Calif., large industrial builders, surveyed officers of over 300 firms and found the consensus ran against building in 1947. A Bailey Bros. official states their construction jobs are limited largely to food processing plants—many of which are altering to conform to new federal health regulations—a few supermarkets, and Army, Navy and veteran hospitals. Bailey Bros. now adds 10 per cent to their bids on projects to provide for increased costs.

Consolidated Steel's Pipe Division Booked Far Ahead

Consolidated Steel Corp.'s Welded Pipe Division now has almost three years' work on order, provided by two major pipeline projects.

The award of the fabricating contract for 980 miles of 30-in. pipeline for Trans-Arabian Pipeline Co. brings the firm's estimated pipeline orders to 1300. The company is now working on a 214-mile order for 30-in. pipe for the California-Texas natural gas line, given it by Pacific Lighting Corp. operating subsidiaries. Reportedly, it has also been given another 100-mile order by El Paso Natural Gas, at the other end of the projected interstate gas line.

Freehand estimates place the steel requirements for the Arabian pipeline near 280,000 tons of steel plate. Geneva Steel Co. will supply the plate.

SEWER PROJECT: Reinforcing bar cage for the submarine outfall sewer pipe of the Los Angeles Hyperion sewer project is shown just before placement of the concrete pouring forms, a portion of which can be seen in the background. Thirty-two sections of this pipe, each 100 ft long with 12 ft inside and 14 ft outside diameter will be required. Each cage requires approximately 23 tons of reinforcing bars, which are being fabricated by Bethlehem Pacific Coast Steel Corp., Los Angeles

Los Angeles Manufacturing Plants Severely Affected by Chronic Sheet Steel Shortage

LOS ANGELES

FOR SOME weeks past, recurrent rumors in Los Angeles point to increasing close-downs or at least slowdowns in operation of plants depending upon steel sheets. While industry spokesmen, in the main, deny these rumors, other credible sources corroborate them, as does the actual chronic shortage of all flat rolled steel products.

It appears many manufacturers are new in business and have no established standing as warehouse or mill buyers. The situation is aggravated also by the fact that new businesses continue to open on hope alone and shortly reach the stage where supplies dwindle or do not become available at all. This is despite the fact suppliers are frank in declaring that another year, at least, probably will elapse before deliveries can be made with certainty and on time.

To a lesser degree, small diameter bars are needed in southern California. While these are obtainable on a hit or miss basis, as, for that matter, sheets are too, many factory operations undeniably are being slowed because of their lack.

A corollary of this condition, as it is reflected in both sheets and bars being hard to get, is the condition of manufacturers' inventories, which are at an all-time high. Reason is that inventories as listed with creditors always contain partially assembled articles. These, due to the shortages mentioned, also are at an historical high.

An example is that of one firm making a unit by the hundreds wherein a small gas engine is a vital component. Because quantities of gas engines are unobtainable, this company holds the unfinished machines in inventory.

Labor Government Prescribes More "Austerity" for United Kingdom

White Paper warns "we may never restore the foundations of our national life" unless man-output increases, coal production rises and exports reach 140 per cent of 1938 volume. Dollars to pay for imports is troublesome problem

LONDON

ALTHOUGH the easing of the ban on power consumption and the reopening of blacked-out British factories has restored the economy to a semblance of normalcy, the recent White Paper, "Economic Survey for 1947," points up the seriousness of the economic problems which confront the United Kingdom.

Hailed as a document of outstanding importance, the paper discloses to the British people the nature of the postwar crisis and offers a short term plan to overcome the difficulties.

The report emphasizes the gravity of the situation by stating: "Unless we concentrate upon these really important things (which are set forth in the text), we may never restore the foundations of our national life."

The plan proposed by the government is somber and austere. It demands more work from all. It promises no reward this year, but envisages more restrictions, extended cuts in electricity, especially for home use, continued food rationing and fewer consumer goods for the home market.

Dollar Dominates Plans

Dominating the whole plan is the problem of the dollar. Because of the imperative need for getting dollars to pay for imports, which come mostly from the western hemisphere, the British are gravely concerned over the drains on their United States and Canadian loans. Most exports are going to the sterling countries of Europe and Asia.

By the end of last year British exports had been boosted to 110 per cent of the 1938 rate. This was good but not nearly good enough, and for 1947 the government says exports must be raised to 140 per cent of the 1938 volume. To get total exports that high, exports of manufactured articles must rise to 165 per cent of the prewar level, due to the fact that Britain will not be able to export any coal and that the old export standbys such as cotton, yarn and textiles cannot be expected to rise much.

Among the principal measures proposed by the government to implement its plan are the following:

Increasing the labor force by the introduction of 100,000 foreign workers, drawn primarily from Poles now in the kingdom and from displaced persons of the continent. An attempt to persuade women to re-enter industry also will be made.

Exemption of coal miners from compulsory military service for the next five years in an attempt to attract more workers to this industry, now seriously undermanned.

Introduction of more incentive pay plans, such as piece work bonuses and profit sharing.

Governmental direction of investment to provide at least 15 per cent more capital for equipment and maintenance of plant for industry, agriculture and mining.

SMOKES VS. MACHINES

The British Labor government is having some difficulty in explaining why during the last half of 1946 when United States and Canadian credits were available, only 5 per cent of Britain's expenditures in the United States was for machinery. Her other expenditures: Tobacco, 32 per cent; film, 7 per cent; food, 24 per cent; raw materials, 11 per cent; oil, 12 per cent.

The White Paper frankly admits Britain has not enough resources to do all that she wishes to do and barely enough to do all that must be done. There is not enough coal, electricity, steel or manpower.

The target for coal production for 1947 is 200 million tons, compared with 189 million tons in 1946. The 1947 goal would provide only for minimum needs and to reach that goal will require getting more men into the mines and raising output per man.

The recent limitation of use of electric power was attributed to failure in coal supplies, but even when there is adequate coal, generating capacity is not available to meet the increased demand. Drastic measures will be taken to hold down the domestic load throughout the year.

The steel shortage is caused by the lack of coal and the lack of imports. The government expects production in 1947 will be somewhat higher than the 13 million tons produced in 1946. Finished steel amounting to nearly 9 million tons should be available for use in Britain and this with great care should be sufficient to provide the essential needs of industry. Expansion of metalworking industries using steel will be discouraged.

Traffic load on railways is nearly 400 million ton miles a week compared with a prewar load of 326 million ton miles. Shortages of rolling stock is seriously curtailing railway capacity and the chief task of the carriers in 1947 will be to make up arrears in equipment and maintenance.

Demand for all kinds of industrial equipment is so enormous that strict priority will be maintained. At least 15 per cent more work on capital equipment will be required than in normal prewar years.

Export Screw Group Urged To Adopt Antitrust Measures

Federal Trade Commission, Washington, as a result of hearings begun Feb. 8, has recommended that the Export Screw Association of the United States, Providence, R. I., and its member companies readjust their businesses to eliminate practices which are held in violation of the antitrust law.

The commission's recommendations include the following suggestions: That the association refrain from buying out foreign competitors and terminating their production; that it refrain from entering into agreements by means of which the United States is designated as the home market for members of the association and importation of wood screws prevented; that machinery for the making of wood screws should not be made unavailable to manufacturers or potential manufacturers; that it refrain from entering into agreements with foreign competitors whereby export of wood screws to the United States might be limited or prevented.

It was further recommended that the association refrain from entering into agreements with nonmember wood screw manufacturers in the United States.

U. S. Oil Equipment and Pipe Line in Canada Up For Sale

Office of Foreign Liquidation Commissioner, Department of State, has invited sealed bids on the refinery and the pipeline and equipment of the U. S. war-time crude oil facility Canol Project 1, "where is and as is" in Canada. Although this segment of the project for sale represents a government investment of almost $70 million, procurement cost is estimated at $15 million.

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Automobile assemblies exceeding 100,000 a week despite acute shortages of sheet, strip, pig iron, coke, copper, lead and standard parts. Increased production accompanied by slight decrease in working forces

DETROIT

FOR THREE successive weeks, assemblies of passenger cars and trucks have roared past the 100,000-mark, after a couple of attempts at this milepost which just fell short. The achievement is all the more remarkable in face of the continuing complaints over shortage of sheet and strip steel, pig iron, coke, copper, lead, standard parts and other items. It appears a fairly tight balance must exist between these short materials, yet the situation still is not serious enough to prevent assemblies moving along at a 5,000,000 per year clip. True, many of the complaints being voiced currently have to do with materials problems 60 to 90 days away and hence probably relate to efforts to maintain the present production pace, if not to increase it slightly.

An encouraging sign is that overall employment in automotive plants has dropped perceptibly from the total of last fall, and at the same time production has increased. This could be interpreted as reflecting an improvement in productivity of individual working people which in part it undoubtedly is, but also it represents what has always happened in industry—a reduction in the working force once the full tempo of production has been reached, when supplies of materials are uninterrupted and when production kinks are smoothed. It is likely that further increases in assemblies to the extent of 10 to 15 per cent, if possible in terms of materials, could be registered with no additional employees, possibly with a few less than at present.

Used Car Prices Hold

DEALERS ALONG Detroit's used car row are holding their prices of low-mileage 1946 and 1947 models at anywhere from $100 to $300 over delivered prices of the cars new, and while they are not moving much merchandise of this character at the moment, they are gambling business will pick up with spring weather. Incidentally, these sellers find their lots glutted with 1946 models, indicating many buyers have sold their new cars for the long dollar.

Dealers in Nash, Hudson, Studebaker and Kaiser-Frazer models can make somewhat better deliveries than the big three which is natural since the bulk of demand is concentrated on products of the largest manufacturers. The case of K-F is peculiar in that factory sales representatives have maintained their dealers have an order backlog of over 1,000,000 units and yet instances are reported of buyers taking spot delivery of a new Kaiser or Frazer with no order entered. Total K-F assemblies are not much beyond 25,000 or 2½ per cent of the reported order backlog. The inference is that prospective buyers are finding prices on the two models too high or that they have changed their minds after seeing the cars. In any event, there is feeling around Detroit that the newcomers to the industry may be the first to find the sales going rather rough, perhaps inside of a year.

There is universal grumbling among the public over high prices of motor cars, along with speculation over when prices will come down. It would appear a matter of simple economics to predict that prices will not come down until supply catches up with demand, at which time dealers will have to begin some real selling and, as in the past, will start trading up used car allowances or offering extras without charge to attract buyers. After this situation develops, the pressure will come on manufacturers to lower their list prices, hardly much in advance except possibly in the case of smaller companies.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	395,436*	84,109
March		140,738
April		248,108
May		247,620
June		216,637
July		331,000
August		359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

* *Preliminary.*

Estimates for week ended:

Feb. 15	97,276	21,555
Feb. 22	103,400	19,410
Mar. 1	104,802	17,575
Mar. 8	105,000	23,050

Ford May Cut Again

REPORTS ARE heard to the effect Ford may announce a second general price reduction this summer as further demonstration of announced plans to drive prices down. As a gesture the idea is good, as was the first price cut. From the hard-headed business standpoint, the move does not seem to make much sense since Ford presumably has in sight orders for the equivalent of more than a year's production at present prices, so why trim prices, when the business is already in hand.

Labor Uneasily Quiet

UNEASY QUIET prevails in the ranks of automobile labor. Beyond an occasional publicity blast from Walter Reuther, UAW-CIO head, supporting or denouncing some pending congressional action, there is little to disturb the calm. Chrysler negotiations are dragging on, the old contract having been extended another 30 days from Feb. 26. Reuther maintains the average auto worker is earning 6 cents an hour less, in terms of the buying power of his wages, than he did in 1940, but for that matter what group of workers is doing as well. When, without a smile, he told a senate committee recently, "we have never believed in the concept that a labor union should function as a narrow, pressure group that grabs all it can, regardless of the effect on the rest of the community," the average listener can be pardoned a slight, "hmmmm."

Strikes Hurt Union

ALTHOUGH THE figures are pretty stale, the UAW-CIO financial report for the year ending May 31, 1946, demonstrates graphically the inroads which strikes and declining membership made on its financial status as of last spring. Toward the end of 1945, while the GM strike was in full swing, the international union cashed in all of its government bonds and was forced to borrow $250,000 from other CIO internationals to protect its bank balance. Liquid assets in 12 months declined from over $2 million to around $135,000. Monthly

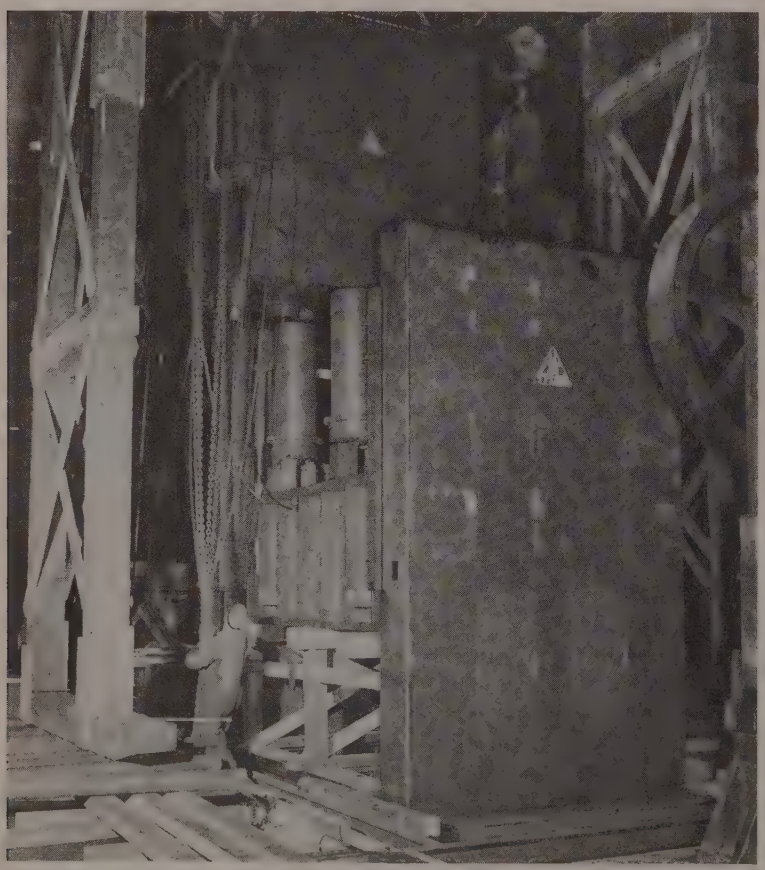
dues were raised last May, which, together with an increase in membership to around 700,000, are now claimed to be sufficient to keep the organization's general fund in the black, assuming the membership level holds.

The union's strike fund, however, by the end of last year was in dire straits. Over $1 million was disbursed in the GM strike, plus around $150,000 monthly for the protracted J. I. Case and Allis-Chalmers strikes, lowering the balance in the strike fund to under $100,000. Income to the fund was principally a 5-cent subtraction from monthly dues of $1.50, and this had to be reinforced by a special assessment payable either last month or this.

Tucker Advertises

APPEARANCE OF advertising in Sunday papers describing briefly the revolutionary new Tucker Torpedo passenger car probably signals the kickoff of a campaign to sell a $20 million security issue to finance equipment of the Chicago plant for production of the vehicle, the like of which has never been seen on U. S. roads. Many changes have been effected in both the design of the model and the personnel associated with Preston Tucker in the venture since first pictures of the "car with the Cyclops eye" were released over a year ago. Most of the alterations have been in the direction of the conventional as far as the product is concerned. Originally proposed aluminum body has reverted to steel. Engine is rear mounted, of the six-cylinder horizontal-opposed type, reportedly 150-horsepower, 5 x 5 bore and stroke. Block is aluminum alloy, and it is proposed to spray the blind-end cylinder bores with aluminum bronze to form cylinder walls.

The WAA has given Tucker until July 1 to complete his financing and execute his lease-purchase-contract on the portion of the former Dodge Chicago engine plant where he will center his operations. The plant is the scene of the forthcoming national machine tool show in September. Originally the deadline on Tucker's contract had been Mar. 1, but he complained government litigation has delayed his financing arrangements, backed by the Chicago investment banking firm of Floyd D. Cerf. At the moment, there are about 200 working with Tucker in the Chicago plant, building up several prototypes of his automobile. He has stated full production will require employment of 35,000.



Eighty-two-ton crown is hoisted into position on press at Hudson Motor Car Co., Detroit

Defers Light Car Decision

ORIGINAL PLAN of General Motors to make an official decision March 13 on whether to proceed with the Chevrolet-Cleveland light-car venture, tabled since last summer, has been deferred another 60 days or to about May 15. Equipment suppliers have been notified that their original tentative shipping date of Sept. 15 on tooling in the event of favorable action, must now be postponed until Nov. 15. Reports in steel circles indicate most structurals for the two Cleveland plants have been fabricated and are now lying in the fabricator's yard.

A considerable volume of machine tool and production equipment has been ordered tentatively on the project, and in addition several lots of tools have been purchased by GM from the WAA.

Hoist 82-Ton Crown

HOISTING an 82-ton crown onto a 200-ton Clearing press at the Gratiot Avenue plant of Hudson Motor Car Co., Detroit, was an erection feat of no small proportions, requiring a 14-man crew plus assorted rigging and hoisting equipment. The "coronation" began on a Friday midnight and was completed by midnight Sunday. The crown, shown in accompanying photo as it was about to be swung into position on the press, had to be lifted 15 feet into the air from the floor, then moved about 20 feet laterally into position, requiring combined efforts of a 10-ton crane, a 15-ton crane, two 25-ton chain falls and a 35-ton chain fall. Cranes were shored up by four 30-foot "bents" or stifflegs" built of reinforced 14 x 14 inch timbers which extended from the crane girders to rollers placed on a runway. Each crane received the support of two bents.

Preparations to lift the crown from the floor were completed with the attachment of chain falls to cable lashings around huge steel girders which had been lashed in turn to the crown. The falls were suspended from girders on the cranes. Three and four men hauled away on each fall, aided by the hoisting power of the cranes. Then, with the crown an inch or so above the top of the base, the cranes began to move it over the base, with the bents sledding along on the rollers. When one bent showed dangerous buckling signs, a chain fall was quickly rigged up to take the pressure off the troubled point, and the lateral movement and setting into position were accomplished with relative speed.

Size of the press is indicated by the fact it has an inner punch capacity of 550 tons per square inch, while the blankholder capacity is 375 tons per square inch.

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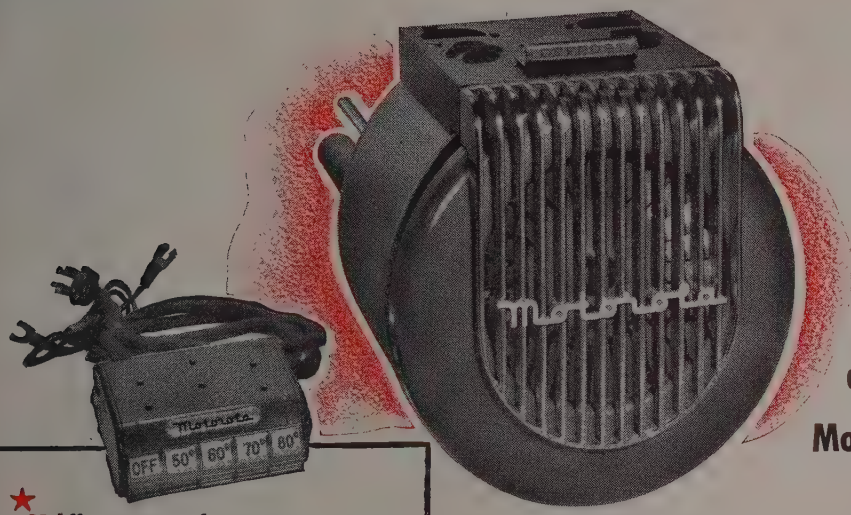

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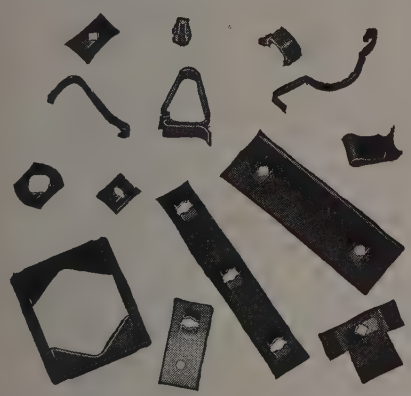

Our new Bulletin No. 214 goes into detail on this Motorola job and is available for the asking. Since you may be able to use to advantage many of the fastening ideas illustrated, write for a copy today.

To take full advantage of the SPEED NUT System of Fastening, Galvin engineers brought the "mock-up" and prints of their new Motorola Heater to Tinnerman for a fastening analysis *before* building tools and dies. They sat right in with Tinnerman development engineers who went over the heater part by part—explored every possible production short cut—planned its assembly from start to finish.

The final design of the heater was modified to take advantage of *standard* SPEED NUTS wherever possible. Where standards could not be used, new SPEED NUTS were created for a more efficient assembly. The result was *assembly perfection.* Many parts were attached with SPEED CLIPS and merely snapped into position under spring-tension. Others were fastened by simply pressing SPEED NUTS over unthreaded studs. And where it was necessary to use screws, SPEED NUTS made the attachments simple and fast.

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Eastern Boosts Its Capacity for Stainless Sheets

Modernization program in all departments raises Eastern Stainless Steel Corp.'s capacity to 2500 tons monthly

EASTERN Stainless Steel Corp., Baltimore, is further expanding and modernizing its plant for production of stainless steel sheets. This is in continuation of the program launched by the company July 1, 1944.

Organized in 1919 — Eastern's predecessor company, the Eastern Rolling Mill Co., was organized in June, 1919, to produce hot rolled annealed sheets, cold rolled sheets and galvanized sheets. Equipment included 13 two-high hot sheet mills and seven cold sizing-finishing machines, 13 heating furnaces and other auxiliary equipment.

The company operated at a loss for a number of years, finding the going especially difficult during the depression. In fact, operations were suspended for over a year—from July 1, 1932, to Nov. 13, 1933. The company started rolling stainless steel sheets in 1935 and switched over to this product entirely in 1940, the last year, incidentally, for which it reported a deficit.

Sales and Profits Rise—Concentration on stainless sheets, plus aggressive management and manufacturing efficiencies, have spelled success for the company in the past several years. Sales rose from $2,768,970 in 1940 to $20,425,607 in 1945. Net profit of $452,836 for 1945 seems small in relation to sales but nevertheless is excellent when it is considered that a large share of earnings has been plowed back into the business in the form of new and modernized equipment.

Acquires Industrial Steels—On Aug. 1, 1945, Eastern Stainless Steel acquired full ownership of Industrial Steels Inc., Cambridge, Mass., through the exchange of 110,000 $5 par Eastern shares for 3000 $100 par Industrial shares. The Cambridge firm is a well known distributor of stainless steel products, handling many items other than the sheets produced by Eastern.

Through the merger, the directorship and management of the company own 150,000 of the 320,000 shares of Eastern stock outstanding.

Capacity Expanded—Under the modernization program, the cold rolling capacity has been expanded through the acquisition of a Lewis 48 in. 4-high cold reducing mill. In the hot mill three of the roughing stands and four of the finishing stands have been equipped with mechanical catchers. One finishing stand has catchers on both sides and a return conveyor to the heating furnace for sheets which must be reheated prior to further reduction. This has greatly increased hot mill capacity.

Capacity of the grinding and polishing department, above, of Eastern Stainless Steel Corp., Baltimore, has been greatly expanded as part of the company's overall modernization program

Four new annealing furnaces have been installed. Two, for the first annealing operation, are of the continuous-conveyor, gas-fired type. Two, for final anneal, are equipped with mechanical loaders and unloaders which lift the sheets into and out of the furnaces, preventing scuffing of the surface.

A new acid-pickling department now is being installed, along with mechanical scrubbers and dryers. This will supplement present caustic-soda pickling capacity.

The grinding and polishing department has been greatly expanded, equipment now including 25 continuous-belt Mattison machines. Other new equipment includes shears and a roll grinder.

The research laboratory has been expanded and modernized. A large portion of its activities are devoted to fabrication problems of customers and the development of improved fabricating techniques.

Capacity Over 2000 Tons Monthly—Total capacity of the mill now is placed at 2000-2500 tons monthly, depending upon the sizes and gages being rolled. Sheets are produced in gages ranging from 26 to 8, lengths exceeding 144 in. and widths up to 72 in.

Several months ago, Eastern installed equipment for spraying a plastic, protective coating called Liquid Envelope on finished stainless steel sheets. It protects sheets in storage and is found to be contributing to a considerable increase in life of drawing dies, plus the elimination of die marks. The same material, made by Better Finishes & Coatings Inc., Newark N. J., is used by the Navy (STEEL, April 29, 1946, p. 133) for sealing metal coverings over deck equipment on inactivated vessels.

Expanding Market Seen—A further expansion of the market for stainless steel is seen by the management of the company, who points out that practically the entire dairy industry has standardized on stainless steel and that the food industry is moving in that direction. One company is making a completely stainless steel stove for commercial use. Domestic stove makers are using stainless for oven linings. Stainless hot water tanks are under consideration. Among the many other undeveloped outlets are linings for home chimneys.

WAA Asks Bids for West Coast Steel Foundry

War Assets Administration has called for bids Mar. 18 in San Francisco for purchase or lease of an open hearth and electric steel foundry in Pittsburg, Calif., which was leased and operated during the war by the Columbia Steel Co. Plant which cost the government $8,500,000 has a rated annual capacity of 30,000 net tons of castings annually.

BRIEFS . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Conlon-Moore Corp., Chicago, manufacturer of cooking and heating appliances, has been formed by merging Conlon Corp., Chicago, and Moore Corp., Joliet, Ill. Bernard J. Hank is president.

—o—

Standard Stoker Co. Inc., New York, and **Read Machinery Co. Inc.**, York, Pa., will present a plan for merger at meetings this month of stockholders in the two companies.

—o—

General Electric Co., Schenectady, N. Y., has launched a nation-wide program, backed by a service organization, to supply the farmer with electric equipment.

—o—

Continental Can Co., New York, has purchased from WAA an aircraft supercharger plant in Milwaukee for $2,626,627. Formerly operated by Allis-Chalmers Mfg. Co., it was built at a cost of more than $4 million.

—o—

Anderson Stove Co., Anderson, Ind., has purchased an aluminum cylinder head plant in Anderson from WAA for $429,000. Operated by General Motors Corp. during the war, the plant cost the government more than $1 million.

—o—

Hewitt Rubber Division, Buffalo, Hewitt-Robins Inc., has appointed Ellis & Lowe Co. as a distributor for its industrial rubber products in the Tampa, Fla., area.

—o—

Truscon Steel Co., Youngstown, has purchased equipment and dies of Knapp Bros. Mfg. Co., Joliet, Ill., for manufacture of plastering accessories. The equipment will be moved to Youngstown.

—o—

Borg-Warner International Corp., Chicago, will handle the export activities of Autopulse Corp., Detroit, manufacturer of electric fuel pumps.

—o—

Siewek Tool Division, Domestic Industries Inc., Chicago, has been purchased by C. D. Reason, former eastern sales manager of the division. The firm has been renamed Siewek Tool Co., with offices in Detroit.

—o—

Service Caster & Truck Corp., Albion, Mich., manufacturer of material handling equipment, announces free training in operation and use of its products to any authorized employee sent to its plants by an industry.

—o—

Leeds & Northrup Co., Philadelphia, manufacturer of electrical measuring instruments and heat treating furnaces, has prepared in booklet form an outline of its practical approach to the problem of industrial relations.

—o—

Monsanto Chemical Co., St. Louis, will begin commercial production of polyvinyl chloride plastic. The project involves construction of additional facilities at Springfield, Mass.

—o—

Milcor Steel Co., Milwaukee, subsidiary of Inland Steel Co., has announced a price reduction on side wall louver ventilators and roof louver ventilators.

—o—

P. R. Mallory & Co. Inc., Indianapolis, has expanded production of aluminum clad low carbon steel in strip form, at its Tipton, Ind., plant.

—o—

American Rolling Mill Co., Middletown, O., has completed 1,755,000 consecutive man-hours of work without a lost-time accident.

—o—

Ekco Products Co., Chicago, has placed a third pressure cooker on the market.

—o—

Air Reduction Sales Co., New York, has opened a retail store in Emeryville, Calif., for its welding and cutting gases and equipment.

—o—

Massey-Harris Co., Racine, Wis., is this year celebrating its 100th anniversary as a manufacturer of farm implements.

—o—

J. K. Larkin & Co. Inc., iron and steel jobber, has moved its general office to 701 Washington St., New York.

—o—

Blue Steel Swim Pool Co., Los Angeles, plans production of a swimming pool to be constructed of hot rolled steel plate.

—o—

Joslyn Supply & Mfg. Co., Chicago, is publishing a monthly stainless steel stock list which includes rounds, squares, flats, wire and a range of angles and channels.

—o—

Magnolia Metal Co., Elizabeth, N. J., has acquired Evans Engineering Co., Waukesha, Wis., manufacturer of a sleeve bearing.

—o—

B. F. Goodrich Co., Akron, has developed aircraft tires for the Navy "Skystreak" plane which carry air pressures of 175 lb per square inch.

—o—

Apex Electrical Mfg. Co., Cleveland, has announced monthly sales volume of $2,500,000 or three times the prewar rate. Production of vacuum cleaners, washers and ironers in 1947 is expected to be about 720,000 units.

—o—

Non Ferrous Foundries Inc., Indianapolis, has installed facilities and perfected manufacturing techniques for production of special heat treatable copper alloy castings made under license arrangement with P. R. Mallory & Co. Inc., of that city.

—o—

Associated Welding Co., Baltimore, has moved from 1809 Lovegrove St. to 1226 Cooksie St.

—o—

Diesel Engine Manufacturers Association, Chicago, will offer an education conference during the week of June 23 for university professors who teach courses in diesel engineering. The conference will include classroom lectures and tours of factories and mechanical engineering school laboratories.

—o—

Cleveland Graphite Bronze Co., Cleveland, at its annual meeting Apr. 7 will ask stockholders' approval of a proposal to double the number of common shares. Purpose of the proposed split is to facilitate wider distribution of the stock.

—o—

Pennsylvania Flexible Metallic Tubing Co., Philadelphia, has opened Pacific division offices on Venice Blvd., Los Angeles.

—o—

Rheem Mfg. Co., San Francisco, has announced that its Australian affiliate, Rheem-Australia Pty. Ltd., has acquired a 15-acre site in Fremantle, Australia, where it will erect a plant to manufacture steel shipping containers.

—o—

Electric Products Co., Cleveland, has opened district offices at the local factory to handle sales and service for western New York, Pennsylvania, Ohio, West Virginia, Kentucky and Tennessee.

—o—

E. W. Bliss Co., Brooklyn, N. Y., has been re-equipping its Toledo, O., plant in order to attain the maximum manufacture of medium size and large power presses, Marshall M. Smith, Bliss president, has announced. Started 18 months ago, changes include installation of new foundry equipment, a new cupola and blower arrangement, time and temperature controls and machine tools valued at $300,000.

—o—

Cherry Rivet Co., Los Angeles, is engaged in building up its inventory of monel rivets and plans to stock popular sizes of the blind rivets for immediate delivery.

Industrial Index Recedes Slightly from Peak Level

SLIGHTLY reduced operations in the steel industry more than offset gains in automobile output and lowered STEEL's industrial production index for the week ended Mar. 1 to a preliminary 158 per cent of the 1936-1939 average of 100. However, that index level is only one point below the postwar high of 159 recorded in the week ended Feb. 22.

The decline in steel ingot output resulted largely from adverse weather and a transportation bottleneck stemming out of a shortage of freight cars. However, at 92.5 per cent of capacity, steel ingot production in the week ended Mar. 1 was at a higher rate than at any time in 1946.

Boosting output still further, auto builders turned out an estimated 104,802 passenger cars, trucks and busses in the week ended Mar. 1. This is the greatest weekly auto production since July, 1941. In auto production history, an output of 100,000 weekly stood out as a substantial achievement. Currently, approximately 70 per cent of the auto industry's output is passenger cars. In the recent upward movement of production the bulk of the increase has consisted of passenger vehicles.

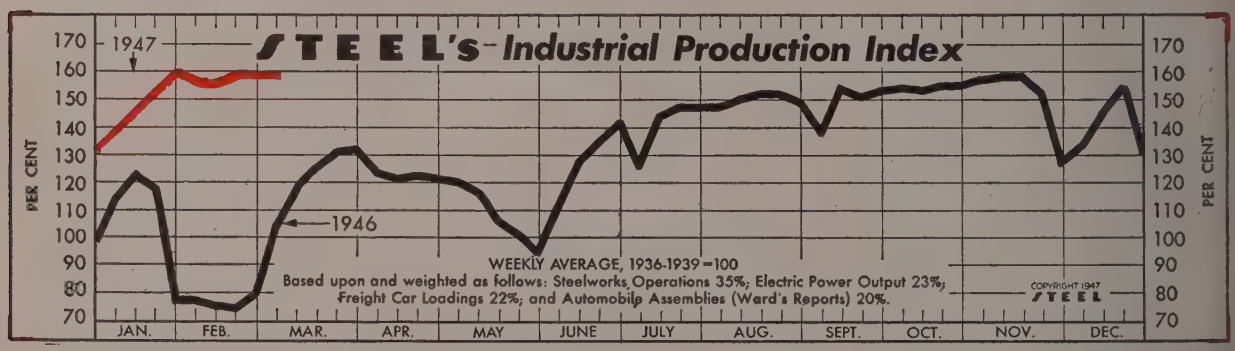
COAL—Also at a high level is bituminous coal production, estimated output in the week ended Feb. 15 being 12,350,000 tons.

EMPLOYMENT—An improved flow of materials, resumption of construction activity, and increases in employment in other non-farm activities are expected to boost employment above the current high levels, the United States Employment Service says. In January, there were 39,657,000 non-farm workers, 2,644,000 more than in January, 1946. With the exception of last December, January, 1947, factory employment was higher than in any month since July, 1945. Significantly, turnover is declining, indicating growing stabilization in the labor market, USES reported. In December, factory workers quit their jobs or took new ones at the lowest rate since early in the war, the quit rate, 29 per thousand workers, being below any month since early 1942.

PRODUCTION—Reflecting the high level of industrial activity with which this year has started is the Federal Reserve Board's industrial production index in January of 188 per cent of the 1935-1939 average of 100. That is the highest level attained since July, 1945.

PRICES—The inflationary trend of prices has produced another new postwar peak in the U. S. Bureau of Labor Statistics wholesale commodity price index, the latest report putting the index for the week ended Feb. 22 at 144.3 per cent of the 1926 average of 100. Since the week ended Feb. 1 there has been a steady rise in the index.

RAILROAD FREIGHT—January's higher level of business activity, compared with December, increased the volume of freight traffic handled by class 1 railroads in January to an estimated 50 billion ton-miles, a rise of one billion over December.



The Index (see chart above): Latest Week (preliminary) 158 Previous Week 159 Month Ago 157 Year Ago 105

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	92.5	94.5	92.5	56
Electric Power Distributed (million kilowatt hours)	4,797	4,778	4,777	4,000
Bituminous Coal Production (daily av.—1000 tons)	2,170	2,058	2,189	2,104
Petroleum Production (daily av.—1000 bbls.)	4,771	4,786	4,650	4,726
Construction Volume (ENR—Unit $1,000,000)	$91.7	$98.5	$94.5	$96.9
Automobile and Truck Output (Ward's—number units)	104,802	103,400	94,114	17,575

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

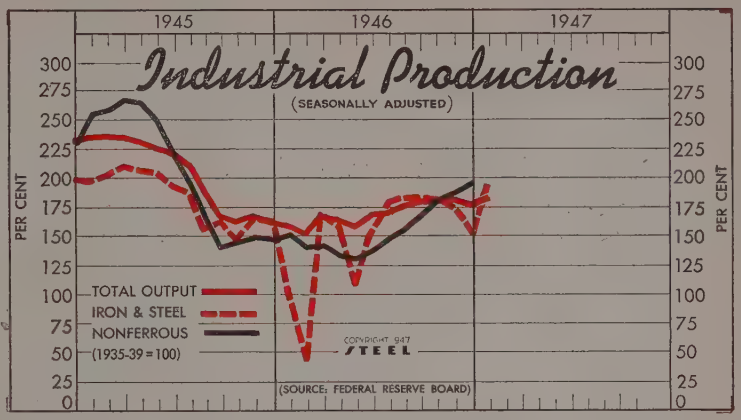
TRADE				
Freight Carloadings (unit—1000 cars)	785†	777	835	782
Business Failures (Dun & Bradstreet, number)	74	58	65	15
Money in Circulation (in millions of dollars)‡	$28,262	$28,276	$28,265	$27,938
Department Store Sales (change from like wk. a yr. ago)‡	+2%	+17%	+17%	+20%

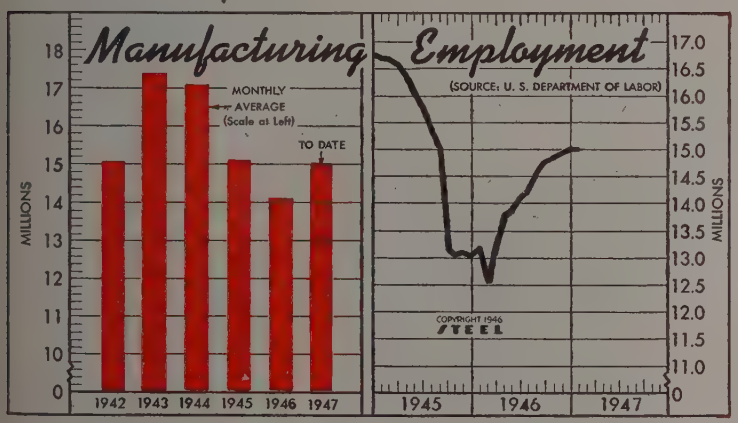
† Preliminary. ‡ Federal Reserve Board.

Federal Reserve Board's Production Indexes

(1935-39=100)

	Total Production 1947	1946	Iron, Steel 1947	1946	Nonferrous 1947	1946
Jan.	188	160	192	102	...	151
Feb.	...	152	...	43	...	139
Mar.	...	168	...	169	...	141
Apr.	...	165	...	159	...	132
May	...	159	...	109	...	130
June	...	170	...	154	...	137
July	...	172	...	179	...	148
Aug.	...	177	...	183	...	156
Sept.	...	180	...	184	...	167
Oct.	...	181	...	183	...	179
Nov.	...	182	...	177	...	187
Dec.	...	181	...	159	...	195
Ave.	...	171	...	150	...	155





Factory Employment

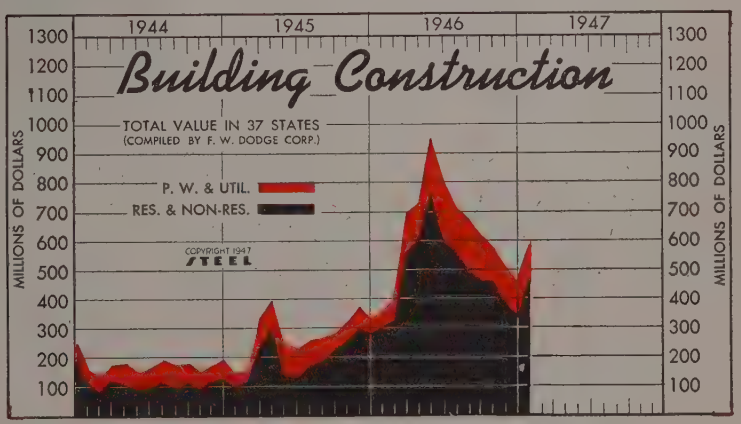
(000 omitted)

	1947	1946	1945
January	15,033	13,236	16,696
February	12,536	16,684	
March	13,206	16,557	
April	13,776	16,302	
May	13,901	16,012	
June	14,098	15,749	
July	14,244	15,331	
August	14,583	15,019	
September	14,731	13,159	
October	14,761	13,048	
November	14,967	13,110	
December	15,048	13,059	
Monthly Ave.	14,091	15,060	

Construction Valuation in 37 States

(Unit—$1,000,000)

	Total 1947	Public Works-Utilities 1947	1946	Residential and Non-residential 1947	1946
Jan.	571.6	113.9	50.2	457.7	307.3
Feb.	....	....	64.7	....	322.7
Mar.	....	....	143.6	....	554.0
Apr.	....	....	128.1	....	606.8
May	....	....	197.9	....	754.6
June	....	....	202.5	....	605.5
July	....	....	153.1	....	564.9
Aug.	....	....	184.4	....	495.6
Sept.	....	....	156.4	....	463.5
Oct.	....	....	112.8	....	460.4
Nov.	....	....	121.8	....	382.0
Dec.	....	....	115.9	....	841.4
Total	....	....	1,631.4	....	5,858.7



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,345	$13,879	$12,735	$9,838
Federal Gross Debt (billions)	$261.5	$259.4	$259.9	$279.7
Bond Volume, NYSE (millions)	$18.3	$15.2	$31.3	$32.2
Stocks Sales, NYSE (thousands)	5,377	4,579	7,033	8,948
Loans and Investments (billions)†	$55.1	$55.3	$56.0	$68.2
United States Gov't. Obligations Held (millions)†	$34,949	$35,150	$36,171	$49,586

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$69.73	$69.73	$69.36	$64.45
All Commodities†	144.3	143.1	140.3	107.4
Industrial Raw Materials†	156.2	154.3	152.1	119.7
Manufactured Products†	140.0	139.1	136.0	103.4

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

CHARLES L. KERR

GEORGE F. JENKINS

RALPH E. LARRY

Charles L. Kerr has resigned as assistant sales manager, National Screw & Mfg. Co., Cleveland, to organize the **C. L. Kerr Industries Inc.**, Cleveland. He is succeeded by **George F. Jenkins**, formerly district sales manager in Chicago.

—o—

George W. Lockwood has been appointed plant manager, Camden, N. J., plant of American Chain & Cable Co. Inc., Bridgeport, Conn.

—o—

Paul F. Mausz has been appointed plant superintendent, L. J. Mueller Furnace Co., Milwaukee. He succeeds **Frank H. Schryer** who has resigned because of ill health.

—o—

George W. Schweinhard, vice president and general manager, Bethlehem Supply Co., subsidiary of Bethlehem Pacific Coast Steel Corp., has retired and **Wendell M. Jones** has been named to succeed him.

—o—

A. T. Gibson, Kelite Products Inc., Los Angeles, has been appointed to the newly created office of assistant to the president. He will be in charge of supervising the development of the new Kelite manufacturing plant in Los Angeles.

—o—

Edward H. Henderson and **Alan N. Ducommun** have been elected directors of Ducommun Metals & Supply Co., Los Angeles.

—o—

R. C. Sogge, General Electric Co., Schenectady, N. Y., has been appointed manager, Standards Division, to succeed **Lee F. Adams,** who has been named consultant for the division. This will permit Mr. Adams the necessary time to devote to his duties as president of the U. S. National Committee of International Electrotechnical Commission and as vice chairman of the Standards Council of the American Standards Association.

—o—

Donald N. Watkins has been elected president and general manager, Laclede-Christy Clay Products Co., St. Louis, to succeed **W. P. Hemphill,** who is resuming active participation in the management of McKinsey, Kearney & Co., Chicago, of which he has been a partner for many years. He continues as a director and advisor of Laclede. Prior to the war, Mr. Watkins had been president of Steel Publications Inc., Pittsburgh, for a number of years, and is now a director and chairman of the board. During the war he was consultant to the Kaiser Iron & Steel group during the construction of its Fontana steel plant. **Walter W. Shipley** has been elected a vice president of the Laclede-Christy Clay Products Co.

—o—

George F. Holland has been elected president of the Union Twist Drill Co., Athol, Mass. He succeeds **W. B. McSkimmon,** who remains as treasurer of the company. Mr. Holland was formerly general manager of the company's Butterfield Division, with plants at Derby Line, Vt., and Rock Island, Que.

—o—

F. C. Sorensen, vice president, Cincinnati Gear Co., Cincinnati, has been elected to the newly created position of chairman of the board. He is succeeded as vice president by **Paul W. Christensen Jr. Paul W. Christensen Sr.** was re-elected president, and **H. S. Miller,** secretary-treasurer.

—o—

William A. Ferguson, Standard Electrical Tool Co., Cincinnati, has been promoted to president of the company, and **Joseph J. Klopp** has been named treasurer. Mr. Ferguson is succeeded as vice president by **Jack J. Falls,** former works manager. **H. V. Feltes** has resigned as president and treasurer.

—o—

Ralph E. Larry, Pittsburgh Limestone Corp., Pittsburgh, has been elected vice president to succeed **H. L. Gordon,** who is retiring after 28 years' service with this United States Steel Corp. subsidiary. Mr. Larry was formerly assistant to the president of the company. He will have his headquarters at New Castle, Pa.

—o—

General Electric X-Ray Corp., Chicago, has announced promotion of three major division managers to the rank of vice president, which increases the number of vice presidents of the company from one to four. They are: **F. E. Scheven,** in charge of manufacturing; **M. J. Gross,** in charge of engineering; and **F. J. Walters Jr.,** in charge of employee and community relations.

—o—

Leonard C. Truesdell has been named vice president in charge of marketing, Hotpoint Inc., Chicago. He had formerly been affiliated with the Bendix Aviation Corp., Baltimore.

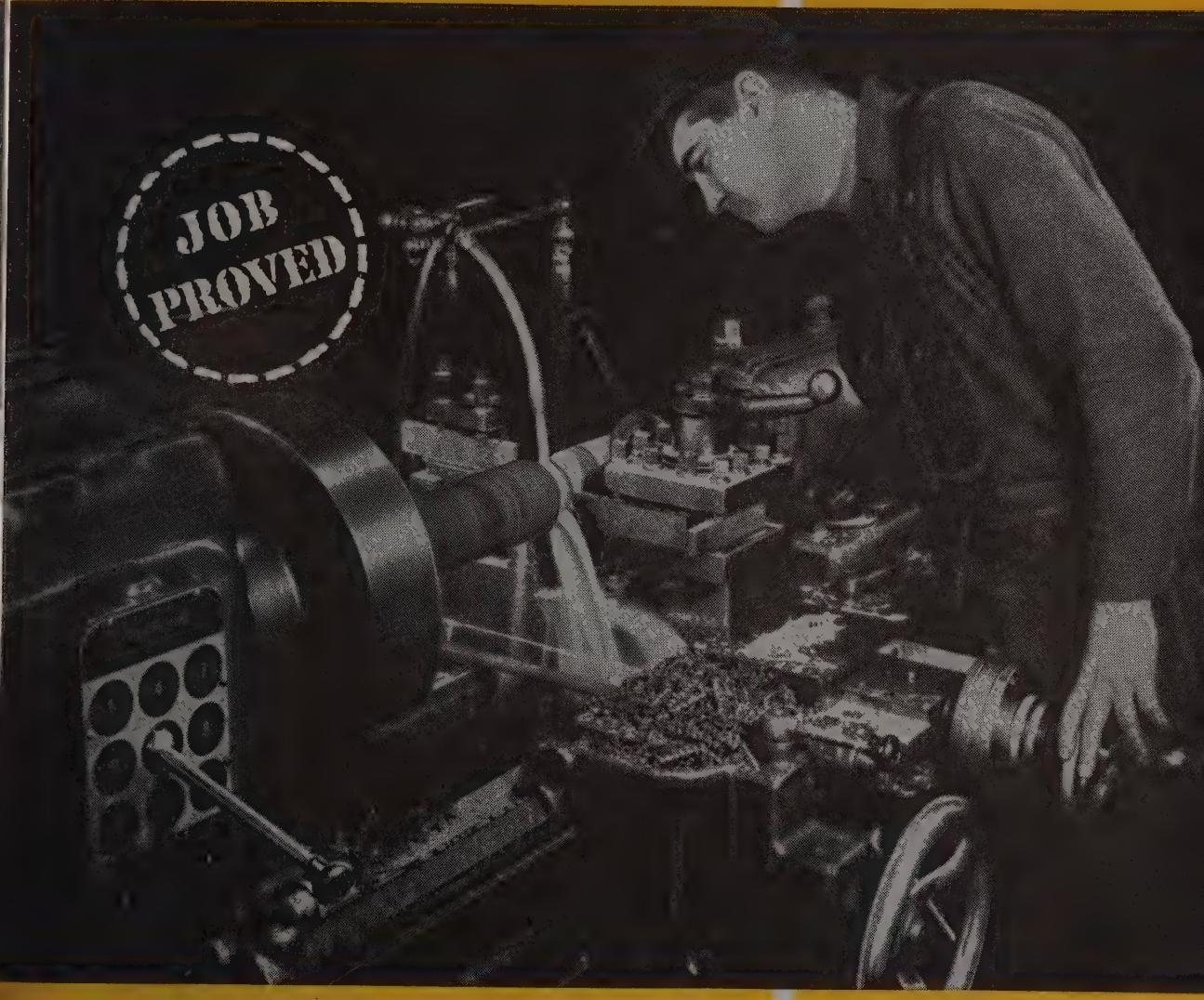
—o—

John Baldwin has been appointed assistant chief engineer, Weatherhead Co., Cleveland. He will have direct supervision of the project engineering and drafting and design groups. **B. R. Teree** has been appointed laboratory director, with supervision over the Weatherhead engineering laboratories.

—o—

K. R. Troyer, General Machinery & Engineering Corp., Hamilton, O., manager of the Hydraulic Press Division, has

3/8" Cut on S.A.E. 4640 Steel



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Permits Heavy Cut on 5" Heat-Treated Shaft

Here is a tough job, just one of thousands in which Sunoco makes possible fast, accurate machining:

Machine — 20" x 96" "American" Pacemaker multi-production lathe
Operation — Turning 5" diameter shaft
Material — S.A.E. 4640 steel, heat-treated
Spindle Speed — 133 r.p.m.
Cutting Speed — 175 s.f.p.m.
Depth of Cut — 3/8"
Feed — .015"
Tool — Cemented carbide
Cutting Lubricant — One part Sunoco to 20 parts water

For greater production, greater accuracy, smoother finish, put Sunoco, the "Job Proved" oil, to work in your shop. Sunoco quickly forms a stable emulsion when mixed with water. It has high lubricating and cooling qualities and is recommended for ferrous and nonferrous metals, alloy and carbon steels. For full information, or for a free copy of "Cutting and Grinding Facts," call the nearest Sun office today, or write Department S3.

SUN
SUNOCO
INDUSTRIAL PRODUCTS

SUN OIL COMPANY · *Philadelphia 3, Pa.*

been promoted to sales manager of all the company's hydraulic veneer and plywood presses, glue room machinery for the wood-making trade, hydraulic compression plastic molding presses, phonograph record presses, brake presses, squaring shears and special machinery.

—o—

T. P. Underwood has been appointed manager of the Indianapolis office of Vanadium-Alloys Steel Co., Latrobe, Pa.

—o—

Alva E. Radcliffe has joined the sales staff of the Barney Florey organization, Cleveland and northern Ohio sales representatives for Automatic Transportation Co., Chicago.

—o—

Charles E. Lydecker has joined the sales engineering staff, Herbert B. Cumming Inc., northeastern New Jersey sales representative for Automatic Transportation Co., Chicago.

—o—

John A. Kobelenz has been appointed district sales representative for the northern section of Ohio for the O. K. Tool Co. Inc., Shelton, Conn., to succeed the late Frederick Schroeder.

—o—

Ralph E. Gordinier has been appointed chief research and design engineer of Eco Engineering Co., Newark, N. J.

—o—

Walter Giger, formerly chief engineer in the railway locomotive division of Brown-Boveri & Co., Baden, Switzerland, has rejoined the Allis-Chalmers Mfg. Co., Milwaukee. He has been placed in charge of promoting the firm's interests in the transportation industry.

—o—

Harry Engvall, Hans Gartmann and **H. V. Rasmussen** have been appointed to positions on the engineering staff of the De Laval Steam Turbine Co., Trenton, N. J. **Mr. Engvall** has been appointed chief engineer of the Helical Gear Department; **Mr. Gartmann,** chief engineer of the Centrifugal Pump & Compressor Department; and **Mr. Rasmussen,** chief engineer of the Turbine Department.

—o—

Westinghouse Electric Corp., Pittsburgh, has announced the following appointments in the sales department and the order service department of the Standard Control Division: **C. A. Schmidt,** manager, thermal breaker section; **W. P. Zerbe,** manager, circuit device section; **R. E. Toomey,** manager, small AC control section; **J. C. Langaunet,** manager, bus duct section; **H. C. Metzger,** assistant order service manager; **J. F. Johnston,** supervisor of shipping and receiving; **G. N. Selen,** chief correspondent in order service; **C. F. Cervone,** stock control supervisor; and **C. B. Magill,** traffic supervisor for the division.

—o—

William P. Good has been appointed engineer in charge of applied research and development, Mid-States Equipment Corp., Chicago.

—o—

David E. Johnson has been appointed a vice president, Steel Improvement & Forge Co., Cleveland. He has been in charge of all production operations of the company as superintendent for many years.

—o—

John W. French, Arco Co., Cleveland, has been appointed sales manager of the Production Finishes Department of the company.

—o—

Robert R. Nash has been appointed director of a recently organized purchase analysis department in the Purchasing Division of the Ford Motor Co., Dearborn, Mich.

—o—

E. W. Sly, Chevrolet Motor Division, Flint, Mich., has retired as general purchasing agent of the plants at Flint. He joined Chevrolet purchasing organization in 1919. He is succeeded by **Raymond D. Steward,** who has held that position at the Chevrolet-Tonawanda, N. Y., plant.

—o—

Albert W. Vanderhoof has been elected chairman of the board and president of the Standard Duplicating Machines Corp., Everett, Mass.

—o—

L. J. Caldwell, formerly manager of the Milwaukee branch of the Eugene Dietzgen Co., Milwaukee, has joined the firm of John Nichols Inc., in charge of the Engineering Sales Division.

—o—

The Specialty Brass Co., Kenosha, Wis., has announced the election of the following officers: **C. W. Anderson,** president; **C. M. Anderson,** foundry and general consultant; **E. H. Kleist,** executive vice president and general manager; **Martin Pedersen,** vice president; **John Skuhra,** treasurer; and **F. A. Weinstock,** secretary.

—o—

Norman F. Hindle, a member of the staff of the American Foundrymen's Association, for the past year on leave of absence as director of the AFA technical development program, has resigned from the association to become associate professor of mechanical engineering at the University of Idaho.

—o—

Frederick M. Eaton has been elected to the board of directors of Monsanto Chemical Co., St. Louis. He succeeds the late **Theodore Rassieur. Dr. Frederic L. Matthews** has been appointed associate director of research of the company's Merrimac Division at Everett, Mass. His former post of petroleum additives co-ordinator in Monsanto's Organ-

HARRY ENGVALL

HANS GARTMANN

H. V. RASMUSSEN

The Most Modern Line of WELDED STEEL PRESSES

Weldments FULLY STRESS-RELIEVED

Warco PRESSES

STRAIGHT-SIDED DOUBLE CRANK PRESS

Warco straight-sided double crank presses, built in capacity range from 100 to 500 tons, are electrically controlled. Optional features are die cushions in bed for draw work, roll feed for automatic operations.

Warco welded steel presses are built in one of the largest and most complete press factories in the world. Even the heaviest jobs are handled on a rapid straight-line production basis. For this reason there is minimum delay in filling orders.

The Warco line marks an outstanding forward step in press engineering and design. Warco presses are engineered for versatility of use, to minimize wear on expensive dies, and for long satisfactory life of the press itself.

Our skilled and experienced engineers will be glad to work with you on any press problem. Write us today, or, if possible, arrange to visit our plant.

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Double Crank Straight Side Press


Two Point Eccentric Gear Press


Press Brake


60t 250 Ton Press


Hydraulic Press


75-Ton OBI Press


Bliss Press


Double Crank Gap Press

ic Chemicals Division will be filled by **Harry W. Faust.** Mr. Faust is succeeded by **Dr. J. F. Palmer** as a group leader in petroleum chemical research in the Organic Chemicals Division.

—o—

The Alabama Clay Products Co., Birmingham, has announced the re-election of the following officers: **W. F. Godejohn**, president; **J. L. Cummings**, vice president; **H. W. Gethin**, vice president and general manager; **R. T. Risk**, secretary and treasurer; and **M. W. White**, assistant secretary.

—o—

John E. Payne has been appointed as headquarters industrial sales manager for the Westinghouse Electric Corp., Pittsburgh. He succeeds **C. B. Stainback** who was recently named industrial syndicate manager.

—o—

C. Stuart Haagensen has been appointed manager of the employment department, Allis-Chalmers Mfg. Co., Milwaukee. He succeeds **J. I. Onarheim** who has rejoined the company's sales organization. **Michael F. Biancardi** has been appointed manager of the health and safety department of the company.

—o—

Leonard C. Andersen, sales co-ordinator of the six divisions of Heil Co., Milwaukee, has been appointed manager of a new district, including California, Arizona and Nevada, with headquarters at Los Angeles. He is succeeded as sales co-ordinator at Milwaukee by **Karl Mindemann.**

—o—

Neele E. Stearns has been appointed assistant general manager of sales, Inland Steel Co., Chicago.

—o—

Charles J. Hardy, chairman of the board, American Car & Foundry Co., New York, has been re-elected a member of the Industrial Conference Board.

—o—

King R. H. Nelson has withdrawn as a partner of the Ferdinand G. Schultz Co., Pittsburgh, but will continue in the employ of the company as district representative. **F. G. Schultz** will continue as sole proprietor of the company.

—o—

Robert A. Nisbet has been appointed superintendent of the Waterford Works, chemical department, General Electric Co., Pittsfield, Mass.

—o—

William D. Taylor, Lukens Steel Co., Coatesville, Pa., has been appointed assistant metallurgical engineer, and **Samuel D. Lemmon,** engineer of tests.

—o—

Leicester B. Bishop has been appointed Ohio regional sales manager for the All-State Welding Alloys Co., White Plains, N. Y. He will cover all of Ohio and Michigan, except the latter state's upper peninsula.

—o—

Charles M. Brown has been appointed sales manager, American Coach & Body Co., Oakland, Calif. Previously associated with the National Steel Products Co., Kansas City, Mo., and later with the McCabe Powers Auto Body Co., St. Louis, he was connected with the Consolidated Aircraft Corp., San Diego, Calif., during the war.

—o—

Robert S. Lee has been appointed to head the Planned Maintenance School of the Twin Coach Co., Kent, O.

—o—

Charles H. Krane has been appointed field engineer for the Norton Co., Worcester, Mass. He will have his headquarters in Hartford, Conn. **Julius F. Lovell** has been appointed assistant controller of the company to succeed **Everett M. Hicks,** who has been appointed assistant manager of the Grinding Machine Division.

—o—

Harry E. Brazier, former plant superintendent, Hudson Motor Car Co., Detroit, has been appointed plant manager of the Cincinnati Engine Division of Crosley Motors Inc., Cincinnati.

—o—

William H. Fellows has been appointed specialized abrasive engineer, Bay State Abrasive Products Co., Westboro, Mass. He will serve the foundry trade in metropolitan Chicago, and the midwestern area.

—o—

York-Shipley Inc., York, Pa., has announced appointments in their Industrial Division. **F. W. Cooper** is assistant manager of the division; **J. Walz Jr.,** district manager for the Middle West; **R. P. Lindemuth,** district manager for the middle Atlantic; and **C. M. Keady,** southern district manager. **W. S. Tallon** is application engineer for the Industrial Division; **E. W. Hagblom** and **B. S. Shewell** are field service engineers.

WILLIAM H. FELLOWS

—o—

Harry N. Baum, advertising manager, Fairbanks, Morse & Co., has joined Gebhardt & Brockson, Advertising Agency, Chicago. He has been closely associated with the metalworking industries for many years.

—o—

Carl A. Eversman has been promoted to plant superintendent, Lorain, O., Division, American Stove Co., Cleveland. He succeeds the late **Albert C. Roeger.**

—o—

Roy Farquharson, Pioneer Engineering & Mfg. Co., Detroit, has been promoted to assistant chief engineer of the company.

—o—

R. B. Calcutt, United States Rubber Co., New York, has resigned from the sales department of the company, after completing 61 years of continuous service.

—o—

Pratt & Whitney Aircraft, East Hartford, Conn., has announced the following appointments in the purchasing department: **E. E. Champion** has been named purchasing agent, finished materials; **W. P. McKown,** purchasing agent, raw materials; **G. F. Flavell,** acting purchasing agent, shop supplies, tools, jigs, and fixtures; and **C. R. Skinner,** assistant to the purchasing manager. **R. W. Pinkham** has resigned from the company.

—o—

The American Hoist & Derrick Co., St. Paul, has announced the election of the following as officers of the company: **Frederic Crosby,** chairman of board and executive committee; **H. O. Washburn,** president; **S. M. Hunter,** vice president of sales; **Donal B. Botkin,** vice president of manufacturing; **J. F. Bishop,** secretary and treasurer; and **R. J. Henry,** assistant secretary.

—o—

John E. Bierwirth, president of New York Trust Co., has been elected a director of Bell Aircraft Corp., Niagara Falls, N. Y.

—o—

Martin G. Levens has been appointed a sales representative for Pittsburgh Plate Glass Co., Pittsburgh, in the company's Columbia Chemical Division. He will cover the Cleveland territory.

—o—

C. W. Conn has resigned his position as assistant open hearth superintendent, Kaiser Co. Inc., Iron & Steel Division, Fontana, Calif. He has been appointed

CHARLES E. SMITH
Promoted to executive vice president, Towmotor Corp., Cleveland. Noted in STEEL, Mar. 3 issue, p. 106

FRANK L. CASSIDY
Elected vice president in charge of sales, Seidelhuber Iron & Bronze Works Inc., Seattle. Noted in STEEL, Mar. 3 issue, p. 104

H. A. ROEMER JR.
Elected vice president, Sharon Steel Corp., Sharon, Pa. Noted in STEEL, Mar. 3 issue, p. 109

superintendent of open hearths for the Ford Motor Co., River Rouge, Mich.

—o—

Floyd Jones has been appointed sales manager of the portable compressor division of the Davey Compressor Co., Kent, O.

—o—

H. S. Hersey, C. O. Bartlett & Snow Co., Cleveland, has been re-elected president and general manager of the company, and **C. J. Neville,** executive vice president and treasurer. Three new vice presidents were announced by the company: **B. A. Smith,** vice president, secretary, and director of engineering; **C. O. Bartlett,** vice president and director of sales; and **H. A. Christy,** vice president and director of manufacturing. **C. Ralph Willson,** manager of purchasing, and **John Hersey** are newly elected members of the board of directors.

—o—

Charles R. Ellicott Jr. has been appointed sales representative in the New York City area for the Symington-Gould Corp., Rochester, N. Y. He will represent that company in the sales of industrial and miscellaneous carbon steel and alloy steel castings.

—o—

Keith Rindfleisch has been appointed Pittsburgh district manager of the United States Steel Supply Co., subsidiary of U. S. Steel Corp. He succeeds **J. H. Fogwell,** who has retired after 46 years' service with the company. Mr. Rindfleisch was formerly assistant district manager in Cleveland and is succeeded in that position by **Wallace W. Clevenger.**

—o—

Joseph C. Edler has been appointed sales engineer, Superior Engine Division, National Supply Co., Pittsburgh. He will have his headquarters in Chicago.

—o—

William J. Hittner has been elected president, Iron City Spring Co., Pittsburgh. **Robert N. Austen** has been named vice president and secretary. Other officers elected include **Charles A. Bardolph,** treasurer; **J. E. Casey,** assistant treasurer; and **William F. Kolling,** assistant secretary.

—o—

Alvin L. Krieg has been appointed assistant to the general manager of the National Machine Tool Builders' Association, Cleveland. He was formerly associated with the American Steel & Wire Co., U. S. Steel subsidiary, as assistant to the director of public relations.

—o—

McDowell Mfg. Co., Millvale, Pa., has announced the following appointments: **C. E. Rickard** has been named production manager; **Charles G. Auchter,** field representative for the company; and **Eric B. Beckman,** industrial engineer.

—o—

Robert Ferriday Jr., treasurer of Metal Industries Inc., Indianapolis, has been elected Indiana district chairman, Pressed Metal Institute, and **Don Harrison,** O. K. Stamping Corp., Fort Wayne, Ind., has been nominated national trustee-at-large of the Indiana district.

OBITUARIES . . .

William S. Armstrong, 59, vice president, Henry Disston & Sons Inc., Philadelphia, died Feb. 17. He had been associated with the company for almost 50 years.

—o—

Louis B. Patterson, 80, one of the founders of the Avey Drilling Machine Co., Covington, Ky., died Feb. 25. He had been president and treasurer of the company.

—o—

Charles J. Hagen, 85, president of the Eagle Mfg. Co., Appleton, Wis., died recently.

—o—

Charles B. Goodspeed, 62, president of the Buckeye Steel Castings Co., Chicago, died Feb. 23.

—o—

George Thompson, 78, former research electrical engineer with the Bell Telephone Laboratories, New York, died in Landsdowne, Pa., recently.

—o—

Ernest M. Sternberg, executive vice president, and one of the founders of the Sterling Motor Truck Co., Milwaukee, died in Miami, Fla., recently.

—o—

Lafayette Young, 69, vice president and general superintendent of the Laclede Steel Co., St. Louis, died Feb. 28. He had been with the company since 1911.

—o—

John A. Markley, 86, founder and president of the Lake Erie Forge & Machine Co., Cleveland, died Mar. 3.

—o—

Eric C. Gyllensvard, export and New York office manager of Farrel-Birmingham Co. Inc., Ansonia, Conn., was killed Feb. 17 when struck by lightning while on a business trip in Sao Paulo, Brazil.

—o—

James B. Robarts, 37, general superintendent, Superior Sheet Steel Division, Canton, O., Borg-Warner Corp., died Mar. 1. He had been associated with the company for 21 years.

—o—

Leonard L. Solger, 59, in charge of railway sales for the Chicago district, Republic Steel Corp., Cleveland, died Mar. 3 in Aurora, Ill.

SOLUTION to many of the problems involving design and production economy in commercial trailer manufacturing is being obtained at first hand from road tests which utilize a unique testing technique. By using a mobile electronic stress measuring unit in tow with the trailer being tested, The Trailmobile Co., Cincinnati, O., is able to check the effectiveness of the engineering incorporated in a trailer design—before the model goes into production. Not only has this testing method proved its worth in verifying engineering data which to a great extent had been derived empirically, but much hitherto unknown information has been obtained regarding stress distribution and concentration in the trailer structure.

A test model of the trailer is fully loaded and then subjected to road tests that duplicate every conceivable service condition with regard to stresses set up with the various components of the trailer. During the tes the intensity of stress at critical points on the structure determined and recorded by the instruments carried the mobile unit shown in Fig. 2. Thus, after the roa tests have been completed, a permanent record is ava able which can be studied by the engineering depar ment to determine the most effective high strength- minimum weight ratio for each component as well as th life expectancy of the entire structure.

The testing unit, designed by J. J. Black, vice pres dent and director of the engineering department, and h staff, is a self-contained mobile laboratory for stress an lysis. Instruments carried by this tandem axle "auxiliary trailer include a power unit, a special switchboard whic can handle 48 strain gage circuits, a direct inking oscill graph and 2 high-gain amplifiers. The latter instrument

Mobil

By JOHN PARINA JR.
Associate Editor, STEEL

made by the Brush Development Co., Cleveland, are shown in Fig. 1. The switchboard can handle single circuits to every individual strain gage or it can be used to select gages within certain areas of the structure during special tests.

Stresses are picked up at the points of the structure under study by SR-4 bonded-wire gages. These gages, made by the Baldwin Southwark Division, Baldwin Locomotive Works, Philadelphia, utilize the principle that the electrical characteristics of a wire filament change with a physical strain. Thus, a fine resistance element can be employed in such a way that deformations resulting from applied loads in the body under test manifest themselves in the resistance wire as changes in length and diameter. In turn, these physical changes in the grid affect its electrical properties since electrical resistance is directly proportional to the length of the conductor and inversely proportional to its cross sectional area.

The problem of measuring forces and deformation therefore becomes one of measuring changes in resistance of the grid.

The simplest type of gage is similar to that shown in Fig. 3, which consists of a fine wire grid cemented to a thin piece of paper. To keep the gage as small and light as possible and to increase the resistance of the wire, extremely fine wire is used for the grid. For example, the A-1 gages used at Trailmobile have grids made of copper-nickel wire of the Constantan type that is only 0.001-in. in diameter. The paper to which the grid is bonded is too weak to prevent the strain from being transferred to the wire; it acts merely as a carrier for the filament. This carrier sheet is then cemented to the surface of the member under test and the lead wires are connected to the rest of the electrical circuit. A valuable characteristic of the A type cellulose bonded gages is that they are usable for both static and dynamic testing procedures.

However, because the total change in the resistance of the gage is quite small even for a relatively large stress, this change in resistance is not measured directly. Instead, each gage is used as the unknown resistance of a four-arm Wheatstone Bridge, the bridges being located at the switchboard. Advantage of using the Wheatstone Bridge is that very small changes in resistance may be measured with a high degree of precision. The bridge consists of four resistances, (*Please turn to Page* 102)

Laboratory

. . . . measures stresses in fully loaded steel trailers under actual road conditions. This unique approach to design and engineering problems has permitted the development of a better balanced trailer of lower weight at minimum cost

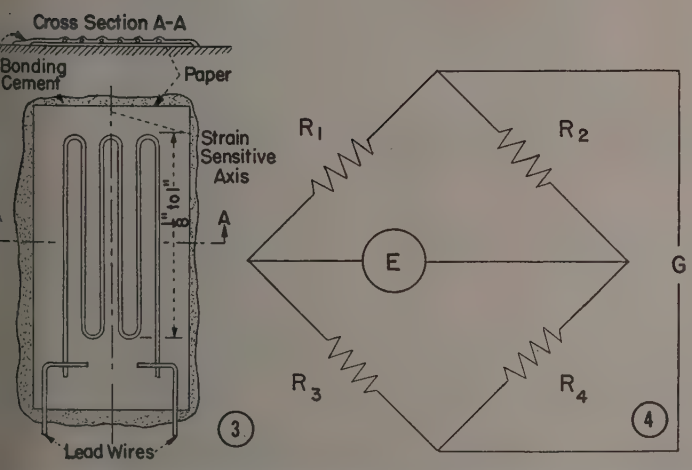


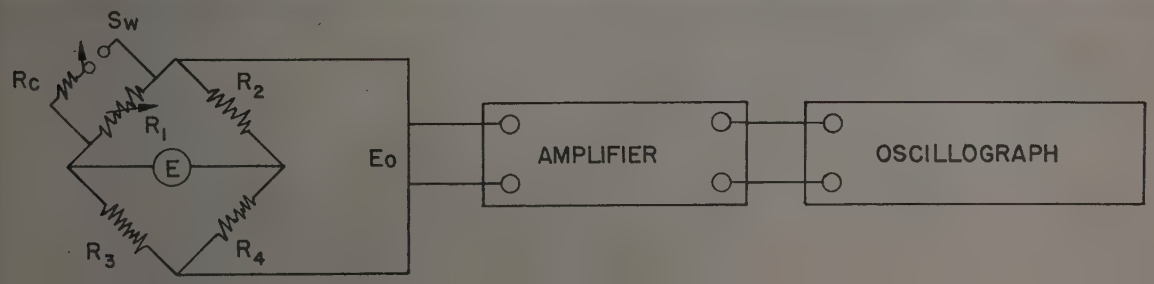
Fig. 1—In the center is the oscillograph with dual charting pens that record stress story on tape. High gain amplifiers are located on either side of the oscillograph

Fig. 2—The mobile stress measuring unit that is towed by the trailer being tested

Fig. 3—Schematic drawing of a bonded-type wire gage

Fig. 4—Network represented is the basic Wheatstone bridge which is used as a bridge circuit for finding the value of an unknown resistance by comparing it with a known standard

Fig. 5—Calibrating and stress recording circuit employed at Trailmobile



Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

ANATOMY OF A LATHE: Speaking of the multiplicity of details which enter into the design of a modern machine tool, I made the following remark in the Aug. 26, 1946 issue, regarding the multiplicity of drawings involved: "If all these layouts were superimposed, the resulting tangle of lines would be beyond human understanding."

A few weeks ago, during a visit to the R. K. LeBlond Machine Tool Co., Cincinnati, I discovered that serious thought was being given to this same state-of-affairs from the standpoint of sales and service. When I saw what my friends, B. N. Brockman and S. R. Best, were doing in a determined effort to solve the problem of "understandability" in connection with their new Dual Drive lathe, I had a strong suspicion that they had been peering between the covers of "the old family medical book" for inspiration.

Be that as it may, they now have sent to me a co pleted job which goes far beyond any of the old fam medical book anatomical charts in clarity of detail and in i genuity of presentation. Thanks to the invention of col printing on cellophane, they have succeeded in superi posing "one layer of lathe upon another layer of lathe" such a way that the assembly of layers constitutes complete picture of the machine in correct color and correct perspective. At the same time, any "layer" c be examined at will in its correct relation with oth "layers."

Messrs. Brockman and Best refer to this unique pr sentation of the anatomy of a lathe as their "'silent sale man." They believe that they have hit upon an entire new technique as far as the pictorial presentation of t whole story of the external and internal "works" of modern machine tool are concerned. I am strongly i clined to agree with them. Every now and then the i needs to be broken in the field of machine tool marketin This is the best example of constructive ice breaking th I have noted for many a long day.

Specifically, this LeBlond "'anatomy of a lathe" neatly packaged in the form of an 11 by 8½ in. brochu hinged on the short dimension. It has a "dynamic cove on which the wheels go around when the book is oscillate

The body of the book consists of five double cellopha sheets, each carrying front and back views of successi layers or details of construction—starting with the cov of the headstock and winding up with a basic view cabinet frame, bed, headstock, drive and feed works, ca riage, apron and tailstock, in partial section after cove

JOINING Magnesium Alloys

By ALLEN G. GRAY
Consulting Editor, STEEL

Continuing discussion of methods of joining magnesium parts, the author covers gas, arc and flash welding and soldering techniques

ADVISABILITY of fabricating a structure by means of fusion welding in preference to riveting or spot welding is usually dictated by the shape of the structure and the purpose for which it is intended. Magnesium alloys can be gas welded using oxyacetylene, oxyhydrogen or oxycarbohydrogen gas. Oxycarbohydrogen is recommended because it provides a more easily seen and therefore a more easily adjusted flame than oxyhydrogen, and a cooler flame than oxyacetylene. This latter fact is especially important when welding thin sheet.

Gas welding usually is preferred to arc welding for light gage magnesium parts (less than 0.1-in. thic which are not highly stressed. Fitup is not critical f gas welding; for example, it is possible to weld pa together where gaps as large as six times the mater thickness (up to a maximum of ⅜-in.) occur. This a definite advantage in fitting up complicated form parts where the accurate fitup required for arc wel ing is difficult to obtain.

Alloy M is readily gas weldable. Gas welds in FS and J-1 must be limited to free welds, otherwise crac ing is liable to occur. Gas welding is preferably limit to joining like alloys although successful welding m

handles, slides, gear clusters, etc., have been "lifted" off by turning intermediate pages. Unlike ordinary pictures, all of these transparencies have both "fronts" and "backs," so that when a layer is lifted off, what is on the underside of that layer—as well as beneath it—can be studied.

I could go on and on giving further interesting things about this book—such as the five-color scheme for identifying various details running through a lathe's anatomy. However, if you are the sort of person who properly should have all these details, send $1.00 to LeBlond and get a copy of the brochure. R. K. LeBlond puts it this way: "We are in the machine tool business—not in the publishing business—and our only purpose in charging for this book at all is to limit its distribution to those who really should have it."

FEAR OF WHAT AINT: As a result of our reviews of the National Machine Tool Builders' brochure, "Ten Great Inventions," both Earl Shaner and I have received a surprising number of letters, all of which—incidentally—are favorable to that brochure and its revelation of basic truths about mechanization.

One of my correspondents is R. J. Kryter, sales manager, Esterline-Angus Co. Inc., Indianapolis. His company makes electrical instruments. Therefore I told him the following "resistance to instrumentation" story.

Heat treating of high speed steel forming tools—or any high speed steel tools—was comparatively a new art back in 1915. One man in the machine tool plant where I then was working, had the knack of peering through a peephole in an oil-fired furnace and detecting by color and "sweat" of the tools when they had reached correct temperature for quenching—2200° F, as I recall it.

Being concerned about what would happen to that phase of the business in case that one individual should pass away, quit or lose his keenness of vision or judgment, the management took steps to install an electrical pyrometer hooked up with a wall-mounted recording instrument.

No sooner had this instrument been installed, than the individual with the "pyrometer eye," with several of his faithful followers, appeared at the front office with an ultimatum to the effect that they would take no responsibility for results of heat treating and hardening operations supervised by "looking at a picture on the wall."

This struck a responsive chord with Mr. Kryter. He writes as follows: "Mr. Angus, president of our company, has under the glass on his desk a cartoon entitled 'The First Pyrometer.' This shows a stooped, grizzled old man shading his eyes with his hand as he squints into the peephole in a furnace door.

"With all the tremendous strides that instruments have made, that kind of thing still is surprisingly prevalent—and it is by no means restricted to instruments. People tend to follow known methods, they are inclined to fear and distrust any new thing.

"I think that it is much like a child's fear of the dark. He doesn't *know* of anything dangerous or fearful or hostile in the dark room. It is the *unknown* that he fears. The same is true of a new invention. Its ultimate effects are unknown—hence people fear and distrust it."

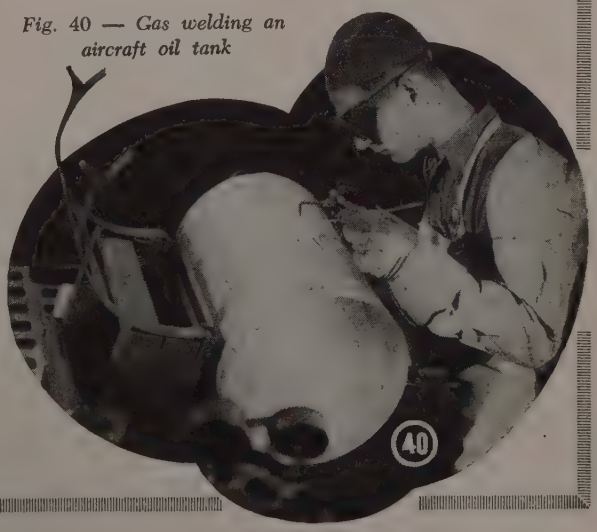
be done if the materials have the same alloying constituents and their melting points are nearly equal. When cast fittings are welded to wrought structures the casting should be made preferably from the same alloy as the wrought material.

Gas welds are limited to butt type joints or corner joints which do not result in flux entrapment such as occurs in lap joints, edge joints, or plug type welds. This is due to the fact that the flux used in welding is an active corroding agent in the presence of moisture and when left in contact with magnesium will invariably result in trouble. If tee welds are made by gas welding, the weld should be made from one side and penetration should be sufficient to push the flux from between the abutting surfaces. All joints should be limited to gages which can be welded in a single pass as flux entrapment is apt to occur when a weld is refluxed for multiple pass welds. The maximum sheet thickness that can be butt welded in a single pass and which, therefore, limits the maximum gage sheet which should be gas welded, is 0.25-in.

Equipment: Standard lightweight aircraft type welding torches are used for welding magnesium alloys. Tip sizes with orifices ranging from 0.035 to 0.081-in. are used depending on the gage sheet being welded.

Various gases and mixtures of gases are used with oxygen for welding magnesium alloys. Acetylene gas is satisfactory for welding gages heavier than 0.064 but normally is not used on thinner sheet as the flame is too hot and therefore difficult to control. Acetylene also causes pitting, probably the effect of high temperature on the flux, on the weld bead surface. Pitting is not particularly harmful but it (*Please turn to Page* 114)

Fig. 40 — Gas welding an aircraft oil tank



Heat Treatment of HIGH SPEE

ANY high alloy steel or high speed steel, in the as quenched condition, is composed of the decomposition products of austenite which is usually martensite, undissolved carbide, and retained austenite. Percentage of these three constituents is mostly a function of the original chemical composition and the austenitizing temperature used.

Martensite is the hard structure which is formed by decomposition of the austenitic grain at relatively low temperatures. In the case of high speed steels the temperature at which martensite starts to form when cooled from the austenitizing temperature is approximately 500° F. Temperature range in which most of the transformation takes place is between 500° and 400° F, although it has been found that some further transformation from austenite to martensite does take place as the steel is cooled on down to and even far below room temperatures.

Temperature at which martensite begins to form is now commonly known as the M_s point while that temperature at which transformation to martensite ends is known as the M_f point, and the temperature range between M_s and M_f is known as the martensite formation range. Investigators have had little difficulty in finding the M_s temperature, but the M_f temperature is much more difficult. We do know, however that both M_f and M_s are influenced by the austenitizing temperature, or, in other words, the grain size and amount of dissolved carbide.

It has been proved by others that some transformation takes place in high speed steel even down to temperatures of minus 250° F. There has been much discussion during the past few years over the value of using low temperature treatments in the cycle of heat treating high speed steels, so that even at this point the reader may have a fair idea of what can be accomplished by the use of such treatment.

Figs. 4, 5, and 6 (which were shown in the first installment and partially discussed at that time) show quite clearly just how much transformation can be affected by subjecting high speed steels to minus 120° F after cooling from the austenitizing temperature. These illustrations show results obtained from specimens of types A, B, and C respectively.

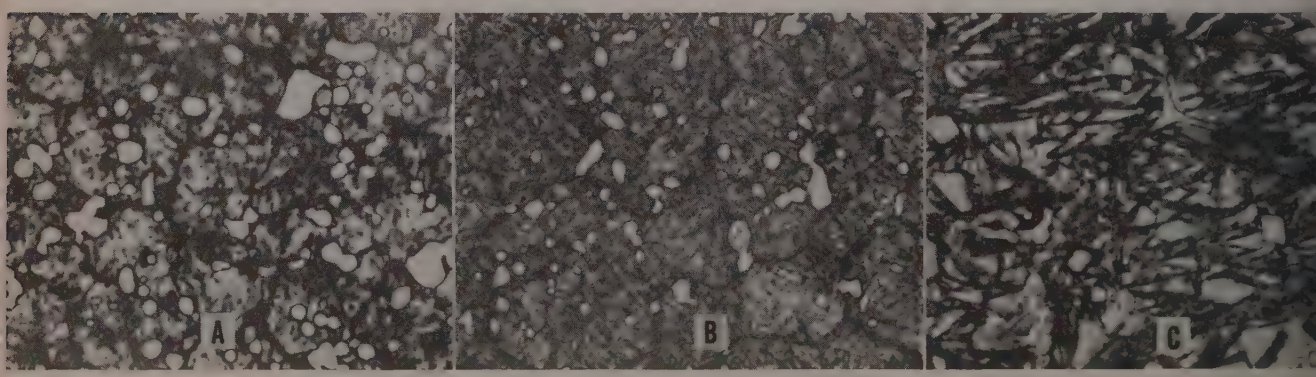
It is interesting to note that for type A steel austenitized at 2150° F only about 3 per cent of austenite is transformed although as the austenitizing temperature is increased to 2450° F the low temperature is capable of transforming about 10 per cent. In type B steel only about 2 per cent is transformed in specimens austenitized at 2050° F. However, this increases so that about 10 per cent is transformed in specimens austenitized at 2350° F. Steel type C, which has high cobalt content, shows the low temperature to have transformed only about 7 per cent in specimens austenitized at 2300° F.

The author has found by previous experience that the transformation which could be affected by low temperature treatment took place gradually as the specimens were cooled though it was arrested at any given temperature as soon as the entire specimen reached that temperature. In other words, prolonged holding periods at temperature have been proved to be of no value and by the same token repeated cycles of low temperature treatment have been found to be of no value in affecting further transformation.

As would be logical to expect, hardness of the specimens also increases as more austenite is transformed. Table II lists hardness readings taken on specimens of type A steel at different steps in the cycle of heat treat

Fig. 4-6—Charts showing retained austenite as a function of austenitizing temperature for high speed steel types A, B, and C, respectively

Fig. 8—Type A steel in the hardened and tempered condition; structure shown in A is of a specimen austenitized at 2150° F and double tempered at 1050° F; austenitizing temperature of B was 2300° F; structure shown in C resulted after specimen was austenitized at 2425° F and double tempered at 1050° F after cooling to room temperature from the austenitizing temperature



By HOWARD E. BOYER, *Chief Metallurgist*
American Bosch Corp., Springfield, Mass.

STEELS

In this concluding article the author advances two postulates: Transformation of austenite in most steels is completed in less time than some former investigations have shown; and major portion of transformation takes place during heating to the tempering temperature

ment. The first column gives rockwell C readings taken on specimens after cooling from the various austenitizing temperatures as indicated while the second column shows the hardness after subjecting to minus 120° F. Tables III and IV are a tabulation of hardness readings taken on specimens of types B and C respectively.

Up to this point discussion has been confined to the structural changes involved in three different types of high speed steel in the austenitizing and cooling operations, including a continued cooling to sub-zero temperatures. To continue, most of the following data discussed will be related to the tempering operations and the physical changes involved.

As was previously mentioned, in case of a straight carbon or very low alloy type of steel the hardness decreases rapidly as the tempering temperature is increased. This hardness drop usually starts at about 250° F and continues to decrease with no sign whatsoever of what is termed as a secondary hardness range. All types of high speed steels behave in a very different manner in tempering operations in that they are capable of developing a secondary hardness when reheated to some elevated temperature after austenitizing and cooling. Fig. 12 is a chart showing the hardness values of the three types of high speed steels when tempered at the various temperatures as indicated on the horizontal axis. All specimens used to obtain data were austenitized at the optimum temperature as indicated and oil quenched to room temperature. Austenitizing time was constant and the tempering time was 2 hours for all specimens. Hardness readings were taken after samples had assumed room temperature. These hardnesses versus tempering temperature curves are typical for high alloy steels such as the high speed types.

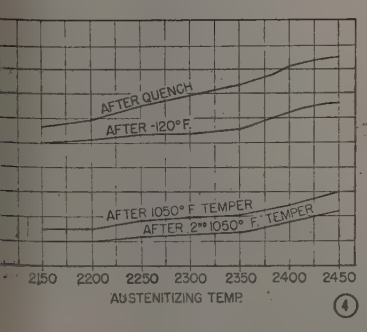
It may be readily observed that on all three types the hardness begins to decrease after approximately 300° F is reached and continues to decrease up to about 700° F at which time the hardness starts to increase and continues to do so from the 1000° to 1100° F tempering range after which the hardness decreases rapidly. To explain this phenomenon it is necessary to again refer to Figs. 4, 5, and 6.

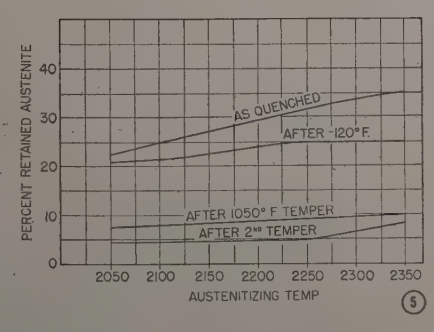
Study of these figures shows that even after the austenitized specimens had been subjected to the low temperature treatment high percentages of austenite remain nontransformed. When such a structure is reheated this retained austenite begins to transform to martensite. In the lower temperature range of heating around 500° F, there is very little if any transformation so that the hardness decreases as the martensite formed from the austenitizing operation (commonly termed as primary martensite) becomes tempered.

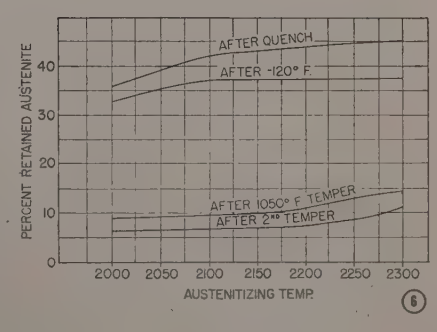
As the temperature is increased, however, larger amounts of austenite transform so that the hardness is increased, thus resulting in the conditions as shown in Fig. 8. The second curve from the bottom in each of Figs. 4, 5, and 6 shows the exact amount of transformation which can be affected by tempering the various types at 1050° F and cooling to room temperature.

A second identical tempering operation will, in most cases, transform a small additional amount which is also shown by the lower curves on these three figures. The results of repeating the same tempering operations more than twice are not shown on these charts since there is very little if any change, therefore we can conclude that all transformation which can be affected without loss of hardness will be accomplished by tempering twice.

It is not possible to transform all of the austenite, as







is shown in the figures just discussed, unless temperatures much higher than 1050° F are employed and since such practice would rapidly reduce the hardness it would be impractical. After the second temper at 1050° F specimens of type B steel austenitized at the optimum temperature of 2250° F still show 5 per cent nontransformed which is commonly termed as stable austenite. In the cases of types A and C the nontransformed constituent after double tempering specimens austenitized at 2325° F and 2200° F, respectively, is about 7 per cent.

In order to determine exactly how much greater net transformation could be attributed to the low temperature treatment a group of test specimens were heat treated in exactly the same manner as those used for the data illustrated by Figs. 4, 5, and 6 excepting the low temperature treatment was not employed at all. Fig. 13 is a chart showing results for type A steel. Since types B and C behaved in a very similar manner charts for these two latter steels are not shown.

Comparing Fig. 13 with Fig. 4, it will be noted that type A steel austenitized at 2325° F, cooled first to room temperature then to minus 120° F and double tempered at 1050° F shows 7 per cent of nontransformed constituent while specimens treated in exactly the same manner but not subjected to the low temperature contained 10 per cent of nontransformed constituent. Therefore, low temperature treatment showed a net gain of 3 per cent transformation after the complete heat treating cycle.

Even though Fig. 12 does show that the maximum secondary hardness values are obtained on three types by tempering at about 1050° F, this is true only when the optimum austenitizing temperature for the particular steel is used. When the steel is austenitized at a temperature too low to obtain sufficient solution of the complex carbide, the peak of secondary hardness will not only be somewhat lower than the hardness values obtained after quench, but also this peak will be reached at a somewhat lower tempering temperature.

By the same token if the steel is austenitized at a temperature somewhat higher than the optimum the peak of secondary hardness will be reached at a tempering temperature slightly higher than 1050° F. In this case the hardness after tempering is often slightly higher than the value obtained after quench. This phenomenon is due to increased amount of carbide dissolved by the higher austenitizing temperatures.

In the last two columns at the right of hardness tabulations in Tables II, III, and IV, hardness variations after tempering are shown for the various austenitizing temperatures. The practice of overheating in order to obtain a higher seconary hardness is usually not to be recommended because a structure with such a coarse austeniti grain is quite brittle.

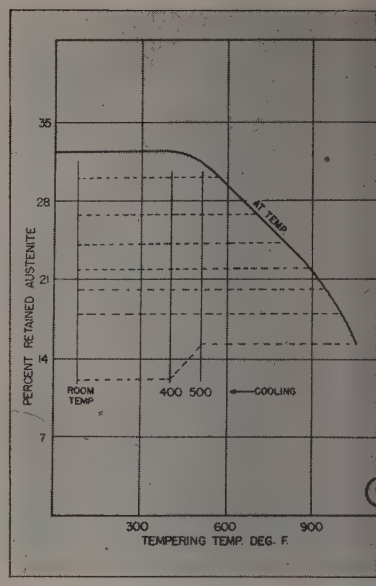


Fig. 9-11 — Charts showing the percentage of existing austenite when measured at temperatures indicated for types A, B, and C, respectively. Curved lines marked "at temperature" indicate the amount of austenite present for specimens after austenitizing at the optimum temperature, cooling to room temperature and tempering for 1-hour at the various temperatures indicated

Figs. 8A, B, and C are photomicrographs taken at X 100 of type A high speed steel in the hardened and tempere condition. Fig. 8-A shows the structure in a specimen o type A steel austenitized at 2150° F and double tempere at 1050° F hardness after tempering in this case wa found to be rockwell C 56; B is a specimen of the sam steel and treated in the same way except that austenitizin temperature was 2300° F. Hardness of this specimen i rockwell C 65; the amount of undissolved carbide ha decreased but the structure has not yet coarsened. Fig 8-C shows the structure of a specimen also type A ste which has been austenitized very close to the fusion poin (2425° F) cooled to room temperature and double tem pered at 1050° F. Even though the hardness of thi specimen is rockwell C 66 this coarse martensite is an un desirable structure because of the tendency to brittlenes and cracking during heat treatment.

Microstructures of steels type B and C are not show inasmuch as they appear almost identical with that of typ A, that is, the martensitic structure born from the aus tenitic grain which has been held very close to its fusio

TABLE II

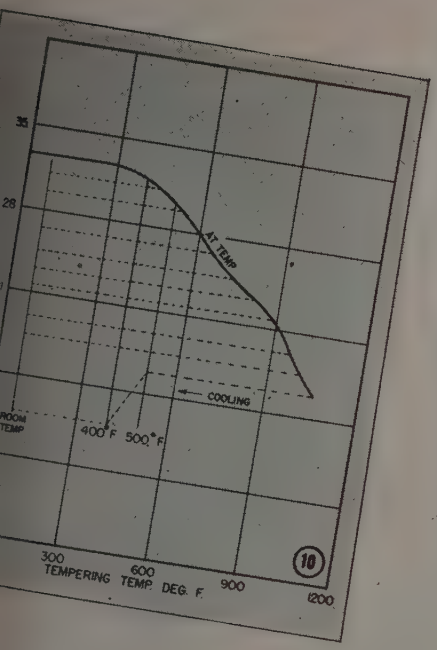
HARDNESS TABULATION - STEEL - TYPE "A"

AUSTENITIZING TEMP	HARDNESS AFTER QUENCH	HARDNESS AFTER -120°F	HARDNESS AFTER 1050° F TEMPER	HARDNESS AFTER 2-1050° F TEMPER
2150° F	C-61.5	C-62	C-58	C-56
2200° F	C-65	C-66.5	C-62	C-61
2250° F	C-65.5	C-67	C-63	C-62.5
2300° F	C-65.5	C-67	C-65	C-64.5
2350° F	C-65.5	C-67	C-65	C-65
2400° F	C-63	C-66	C-66	C-66
2450° F	C-62.5	C-66	C-66	C-66

TABLE III

HARDNESS TABULATION - STEEL - TYPE "B"

AUSTENITIZING TEMP	HARDNESS AFTER QUENCH	HARDNESS AFTER -120°F	HARDNESS AFTER 1050° F TEMPER	HARDNESS AFTER 2-105 TEMPER
2050° F	C-62	C-62	C-60	C-59
2100° F	C-64	C-64	C-61	C-61
2150° F	C-64.5	C-64.5	C-61	C-61
2200° F	C-64.5	C-65	C-63.5	C-63.5
2250° F	C-66	C-66	C-64	C-64
2300° F	C-62	C-64.5	C-65.5	C-64.5
2350° F	C-62	C-63.5	C-66.5	C-66.5



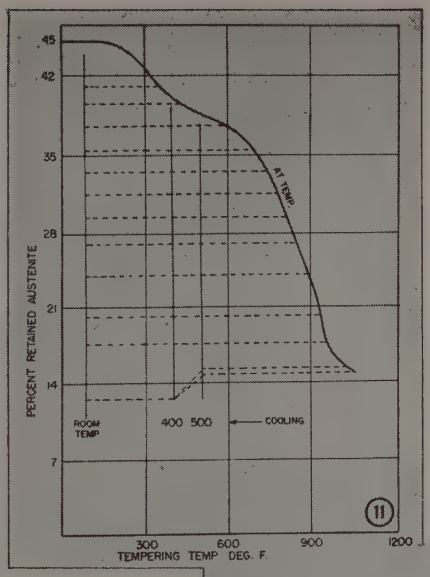


Fig. 12—Chart showing hardness values of the three types of high speed steels when tempered at the various temperatures as indicated

Fig. 13—Results for type A steel which was heat treated similarly to the specimens used for data on Fig. 4 except that the low temperature treatment was omitted

Fig. 14—Chart showing extent of transformation of austenite for the three steels studied over an extended period of time

temperature tends to be extremely coarse.

So far in this general discussion on the subject of tempering high speed steels little has been said in regard to the effects of time at the tempering temperature. It is quite well agreed among metallurgists that time at the tempering temperature has a marked effect on the amount of transformation in almost any steel. For example, it has been commonly thought in the past that a high alloy steel which would normally be fully transformed by tempering at 1050° F for 1 hour could be transformed to same degree in 2 hours at temperature of 1000° F.

There is no doubt that the above is true to some extent, but the author's most recent work has proved that in most all steels, including those of the high speed type, the actual transformation is completed in considerably less time than some former investigations have shown. Chemical composition of the steel is a very important contributing factor to the time required for trasnformation at tempering temperature. Fig. 14 is a chart showing some very interesting results of an investigation made along this line on the three types of high speed steels. All specimens used for obtaining this data were 2 in. length and 0.575-in. diameter and were all austenitized at the optimum austenitizing temperature which was previously selected for these three materials. (*Please turn to Page* 120)

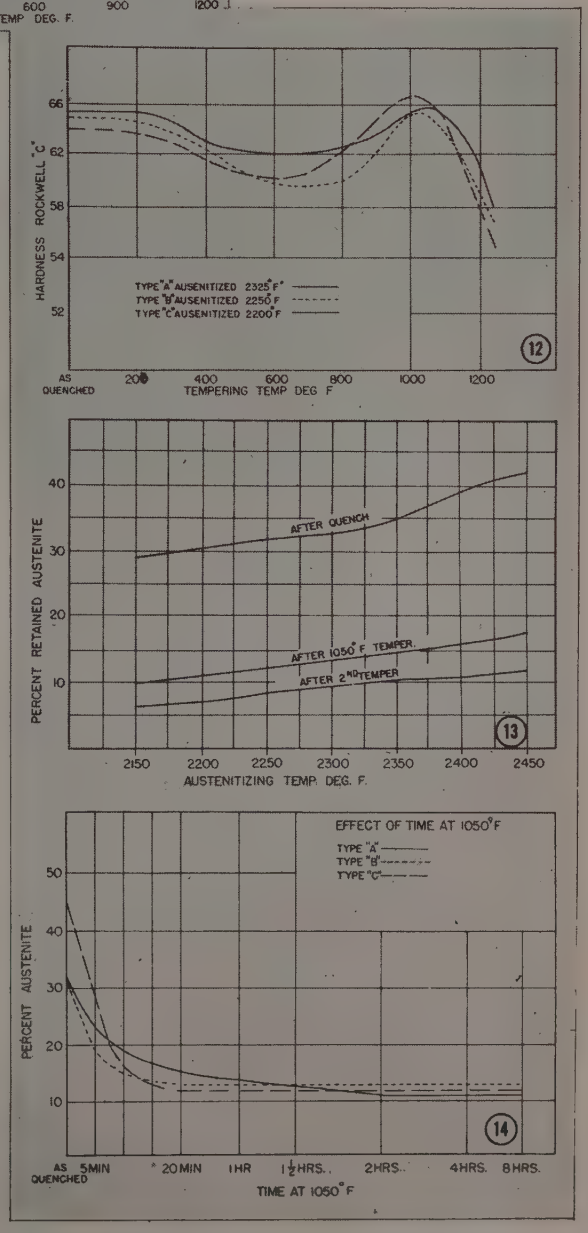


TABLE IV

HARDNESS TABULATION - STEEL - TYPE "C"

STENITIZING TEMP	HARDNESS AFTER QUENCH	HARDNESS AFTER -120° F	HARDNESS AFTER 1050° F TEMPER	HARDNESS AFTER 2-1050° F TEMPER
2000° F	C-61.5	C-63	C-60	C-60
2050° F	C-62.5	C-63	C-61	C-61
2100° F	C-62.5	C-61.5	C-61	C-61
2150° F	C-64	C-64	C-63	C-63
2200° F	C-64	C-65	C-64.5	C-64
2250° F	C-62	C-64	C-64	C-64
2300° F	C-62	C-63	C-64	C-64

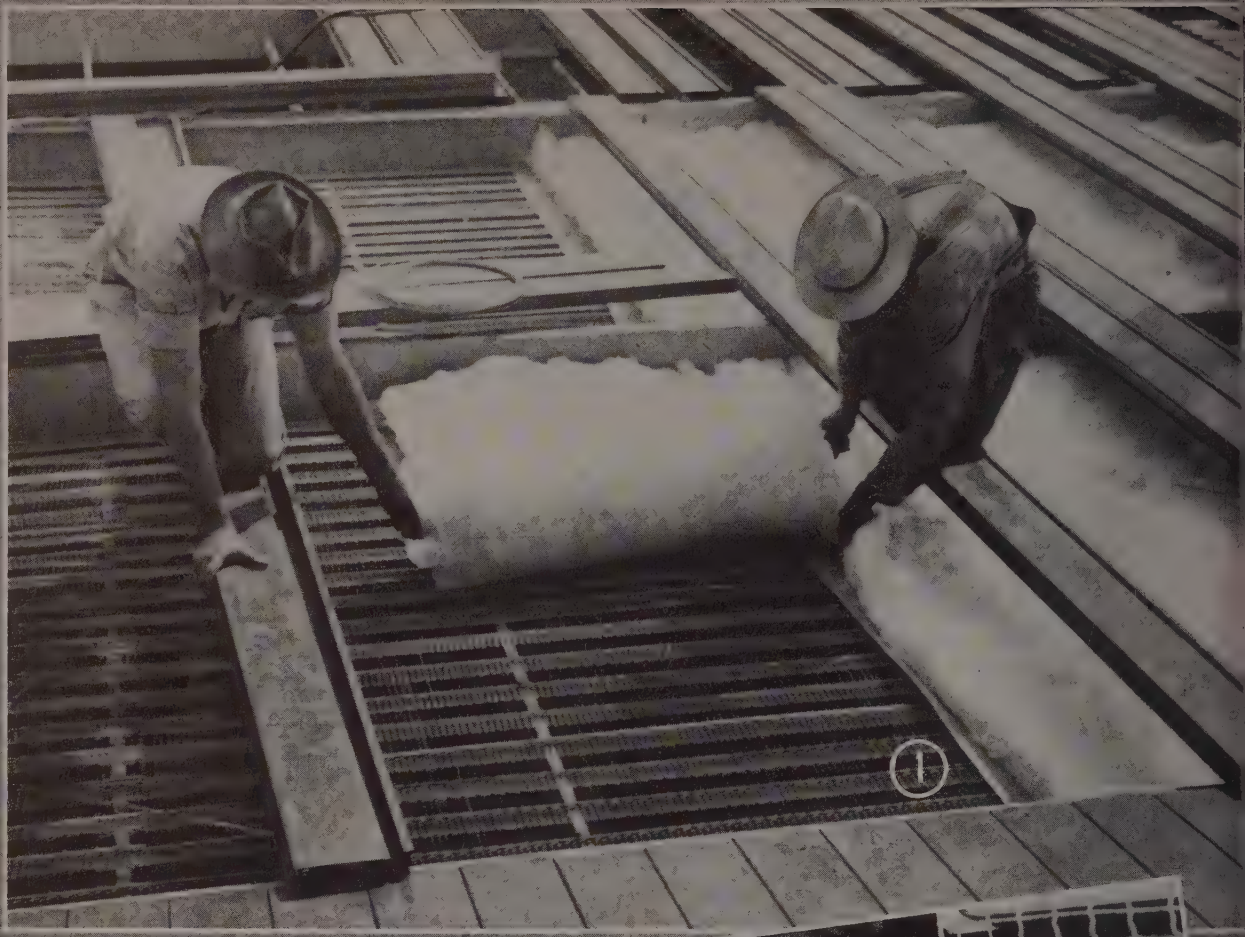


Fig. 1—Glass-fiber thermal insulation being installed in the roof of an industrial plant

Fig. 2—Light-weight glass-fiber material possesses acoustical as well as thermal insulating properties. Here it is being installed in the cabin of an airplane

Fig. 3—These glass-fiber reinforced plastic aircraft parts illustrate adaptability of the material to fabrication of complex and compound-curve parts

Fig. 4—Strength properties attainable with cross-laminated glass-plastic laminates and parallel-laminated glass-plastic laminates as compared with corresponding properties of 24 ST aluminum and structural steel to their yield point. Values are based on laminates made with heat-treated non-directional glass cloth and a representative low pressure resin molded at 15 psi pressure

Fig. 5—Comparison of the energy absorbing values of glass fibers and other materials

GLASS FIBERS *as an engineering material*

GLASS fibers possess the greatest tensile strength-weight ratio of any commercial material either occuring in nature or synthesized by man. Fibers averaging 23 one-hundred-thousandths in. in diameter have a tensile strength of more than 250,000 psi. Experimental glass fibers have been produced with a diameter of 2 one-hundred-thousandths in. and with tensile strengths considerably higher than this value.

Fibrous glass is an engineering material in the same sense that steel, copper and aluminum are engineering materials, and like them, it is produced in a great variety of types and forms. Real start toward commercially useful glass fibers was made in 1931. In that year, research aimed at the development of the necessary processes was initiated in this country by Owens-Illinois Glass Co., manufacturer of glass containers, and by Corning Glass Works, manufacturer of glass specialties ranging from light bulbs to laboratory glassware and giant telescope mirrors.

From 1931 to 1938 Owens-Illinois and Corning, working separately toward the same goal, spent millions of dollars on the experimental and development work required to create the manufacturing processes and acquire the knowledge needed, not only to produce glass in useful fiber form, but to make practical its production on a commercial scale. Rapid progress was made in improved manufacturing processes and products, and in developing markets.

Late in 1938 Owens-Corning Fiberglas Corp. was formed to continue the manufacture of Fiberglas (glass fiber) materials, to carry on further research, to explore additional new uses, and to adapt the materials to still other uses which their inherent properties made them uniquely qualified to serve.

Properties of Fibrous Glass: There is no universal engineering material, in the sense of a material that pos-

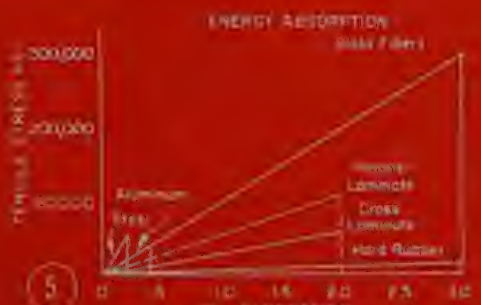
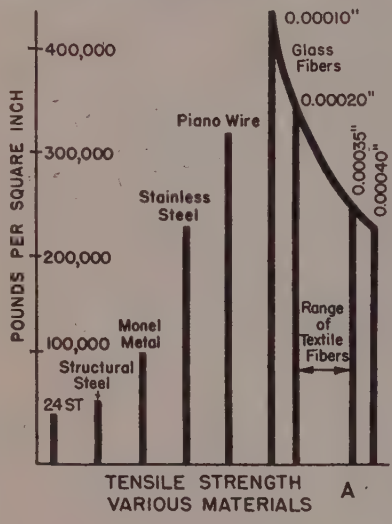


Fig. 6—Installing glass-fiber thermal insulation in the refrigerated compartment of a merchant ship



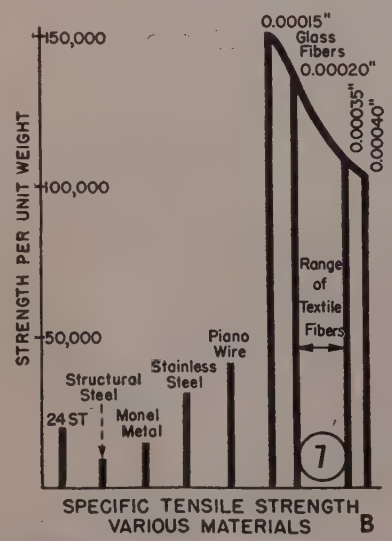


Fig. 7 — Tensile strength of individual glass fibers, in the order of 300,000 psi, is compared with the tensile strengths of a number of other materials. Chart A shows tensile strengths per sq in.; chart B shows specific tensile strengths, obtained by dividing tensile strength by specific gravity—in other words the answer thus derived expresses the strength as strength per pound

sesses properties which fit it to meet all requirements for all conceivable end uses. With any material therefore, a first step is to determine what properties it does possess—both those which will contribute to its wide acceptance and those which may prove a handicap. The next logical step is to determine what end uses its combination of properties fit it for.

Flexibility is the property of glass fibers which distinguishes them from all other forms of glass. Glass fibers are flexible for just one reason. They are almost incredibly thin in relation to their length. Steel is rigid in a thick, short piece, but heat it and draw it out into a fine wire and it becomes extremely flexible. The same is true of glass, but to be truly flexible the diameter of the glass must be much smaller in relation to length, than is required in the case of steel.

Cast aluminum, bulk glass and glass fibers all have about the same specific gravity—2.6 for aluminum, 2.5 for bulk glass, and 2.4 for glass fibers. However, a cubic foot of uncompressed glass fibers of the wool-like type used for thermal insulation weighs only 1½ lb, and is approximately 100 times lighter than a cubic foot of bulk glass. Figs. 5 and 7 give some physical properties of glass fibers in comparison with other materials.

Glass fibers possess high dimensional and physical stability. Although they may be as fine as gossamer, the fibers are neither more nor less than microscopically thin glass rods. Because they have no cellular inter-structure they cannot absorb moisture. Their surfaces can be wet, but moisture cannot get into the fibers. Moisture, therefore, cannot cause them to shrink, stretch or swell.

At tension approaching breaking strength the fibers show an elongation up to 3 per cent. The fibers cannot rot or oxidize, for the elements of the glass are already in a complete state of oxidation. They are unaffected by weak alkalis, and by acids in their most concentrated forms, except hydrofluoric and phosphoric acids. Finally, the fibers are completely incombustible.

In meeting requirements for thermal insulating materials that would stand up under the strains, stresses, vibration and humidity conditions to which combat ships and bomber and fighter planes were subjected during World War II, the Fiberglas Corp. and applicators of its materials developed many improvements in products and insulation methods. These are reflected in the postwar uses of glass fibers in such standard prewar applications as the thermal insulation of homes, refrigerators, food and beverage containers, roasters, stoves and water heaters.. freight and passenger planes, railroad cars, trucks, buses and merchant ships.. factories and other types of industrial and commercial buildings and their equipment.

Forms and Applications: The resilient mass of intricately interlaced glass fibers which is the basis of all forms of Fiberglas thermal and acoustical insulation may be composed of fibers ranging in diameter from 5 to 55 one-hundred-thousandths in., depending upon the purpose for which the insulation is to be employed. The wool-like mass can be installed in the form of bats, rolls, bulk fibers or shredded fibers. Blankets into which the mass can be formed can be faced with paper, a fabric or a metal mesh. Sheets and boards into which the mass can be fabricated can be given a variety of surface treatments, including a sanded, smooth finish on one side, a paper or fabric facing on one side, and an overall asphalt coating. They can be given a hard surface by facing them on one or both sides with sheets of plywood

r even with a plastic material.

Predetermined density of the rigid and emirigid forms can range from 2.5 to lb per cu ft. Density of the other orms can be varied by compression over similar range. The K factor, at 50° ean temperature difference, ranges from .28 for the wool-like uncompressed forms t normal density of 1½ lb per cu ft., o 0.23 for a 9 lb density board. Low hermal conductivity is due primarily to ne millions of air spaces entrapped by ne interlaced fibers. These air spaces re poor conductors of heat. In addition, here the fibers cross and touch each her they have exceedingly small con- ct points. Heat, therefore, cannot pass adily from one fiber to another.

Air spaces, and the tremendous sur- ce area presented by the mass of fibers, osorb and break up sound waves. When lass fiber bats, rolls, blankets, sheets or oards are installed immediately behind perforated surface of metal, asbestos oard, fiber board or similar material, noise reduction factor as high as 0.95 ay be obtained, the exact figure de- ending upon the form, thickness and ensity of the fibrous glass, the type of nish and the method of installation.

Glass fiber thermal and sound insulating materials are inherently firesafe and possess immunity to rot and decay. In addition, the materials provide no sustenance for insects or vermin of any kind. Properly installed, they do not settle down under shock or vibration, leaving gaps for heat or sound to pass through; rather, unless bonded with a resin, the compressed fibers tend to fluff out filling any voids. The amount of moisture picked up by the massed fibers from humid air is small.

Fiberglas thermal and sound insulation is one of the group of mineral wool insulations, including rock wool and slag wool, with which applicators and users have been familiar for a half century. The bat, roll, bulk and shredded forms are suitable for use in all temperatures from subzero to approximately 1000° F. Bats and rolls are widely used in stoves, roasters, water heaters, industrial ovens —also for the insulation of homes and other buildings, railroad cars, ships, buses, and trucks. Bulk fibers are generally employed as an accessory material, for stuffing or packing into odd spaces. The shredded form of insulation is used wherever pnuematic application is called for.

Fibrous glass blankets faced with flame-proofed muslin or Kraft paper are used extensively to insulate buildings, refrigerated freight cars, railway passenger cars, trucks, trailers and buses. Blankets with a facing of noncombustible glass fiber cloth are used to insulate aircraft and aircraft equipment such as gasoline heater exhausts, heat exchanger ducts, and other high-temperature pipes, tubing, ducts and fittings. With a metal-mesh facing, the blankets are employed for the insulation of heated equipment such as boilers, tanks, industrial ovens, large ducts and breechings.

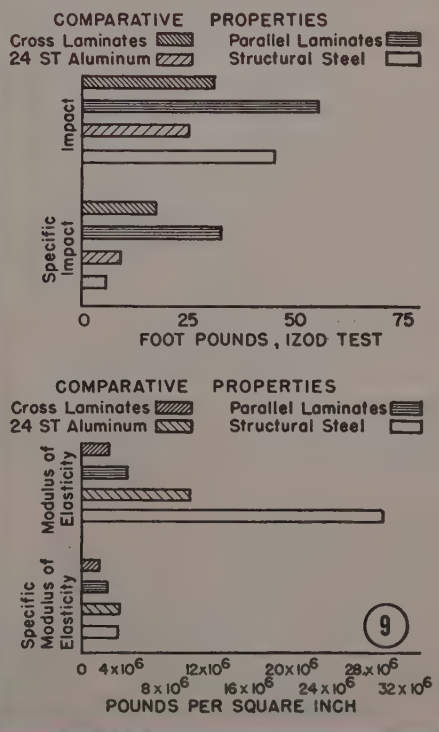
Glass fibers in the form of semirigid sheets or boards are used for building insulation and for shipboard hull and bulkhead insulation. They are also employed in all types of low and medium-temperature equipment up to about 600° F. In equipment operating at temperatures above 450° F, the resin used as a binder disappears from the hot side, leaving a layer of unbonded fibers which fulfills its insulation function with unimpaired efficiency up to 1000° F, so long as it is enclosed by supporting surfaces.

Sheathed on all sides with a tough, durable asphalt coating, a board made of the glass fibers is widely used in cold storage service, and performs efficiently under conditions of moisture and temperature variations such as exist in refrigerated spaces. An asphalt-enclosed board with a density of 9 lb per cu ft can be

(*Please turn to Page* 127)

Fig. 8—Fiberglas insulating cement being applied over Fiberglas metal mesh blankets used to insulate a large tank

Fig. 9—Comparative strength properties attainable with cross-laminated glass-plastic laminates and parallel-laminated glass-plastic laminates as compared with corresponding properties of 24 ST aluminum and structural steel to their yield point



Engineering News at a Glance

PLENTY OF "ELBOW GREASE:" Shining some 8800 sq ft of aluminum skin on the Boeing Stratocruiser involves approximately 60 gal of material. Boeing experts, it is learned, tried a dozen polishes but finally selected a commercial stove polish. This is applied by hand and mechanically buffed. Buffing around windows is done by hand. Women do the major part of the polishing job while the planes are on the final assembly floor. A final touchup is scheduled just before delivery. This requires about 6 hours, and involves 25 polishers working on three different staging levels.

ADDS NEW DESIGN FEATURES: In Mt. Gilead, O., Hydraulic Press Co. reveals new design features in its latest 4-oz plastics injection press make it more powerful and faster acting than its predecessor. Its hydraulic power system comprises a single gear pump, working in conjunction with a newly designed pressure booster, both driven by a direct-connected 15-hp motor. This provides a working pressure of 2250 psi. An internal booster ram effects rapid mold closing, while the main double-acting ram supplies live hydraulic pressure up to 125 tons for sealing the mold. Speed of opening of the injection ram has been raised to 475 in. per min, and a larger size injection plunger provides an injection capacity of 527 cu in. of material per minute delivered at 20,000 psi.

WELDS RUSTY STEELS: Peek into the future of welding is provided by a new series of giant portable spot welders recently shipped from Sciaky Bros. plant in Chicago to help rebuild war-torn parts of the world. Used in bridge and structural steel shops in "prefabricating" steel framework of all types, the heavy-duty machines can spot weld up to three thicknesses of ½-in. scaly and rusty steel. Peak power demand when welding such thicknesses is about 500 kva, and load is balanced on all three phases of the power supply—at near unity power factor. The company reports that correct use of suitable current and pressure cycle is the secret in eliminating the need for cleaning or pickling rust and scale on hot-rolled structurals. When welding high-carbon steels, hardening effect is eliminated by the welders automatically through a quench and post-heat period. Each machine produces from 2 to 4½ spots per minute on maximum thicknesses of steel, and 25 spots or more on minimum thicknesses, depending on degree of scale. It can be operated suspended from an overhead crane or in conventional positions.

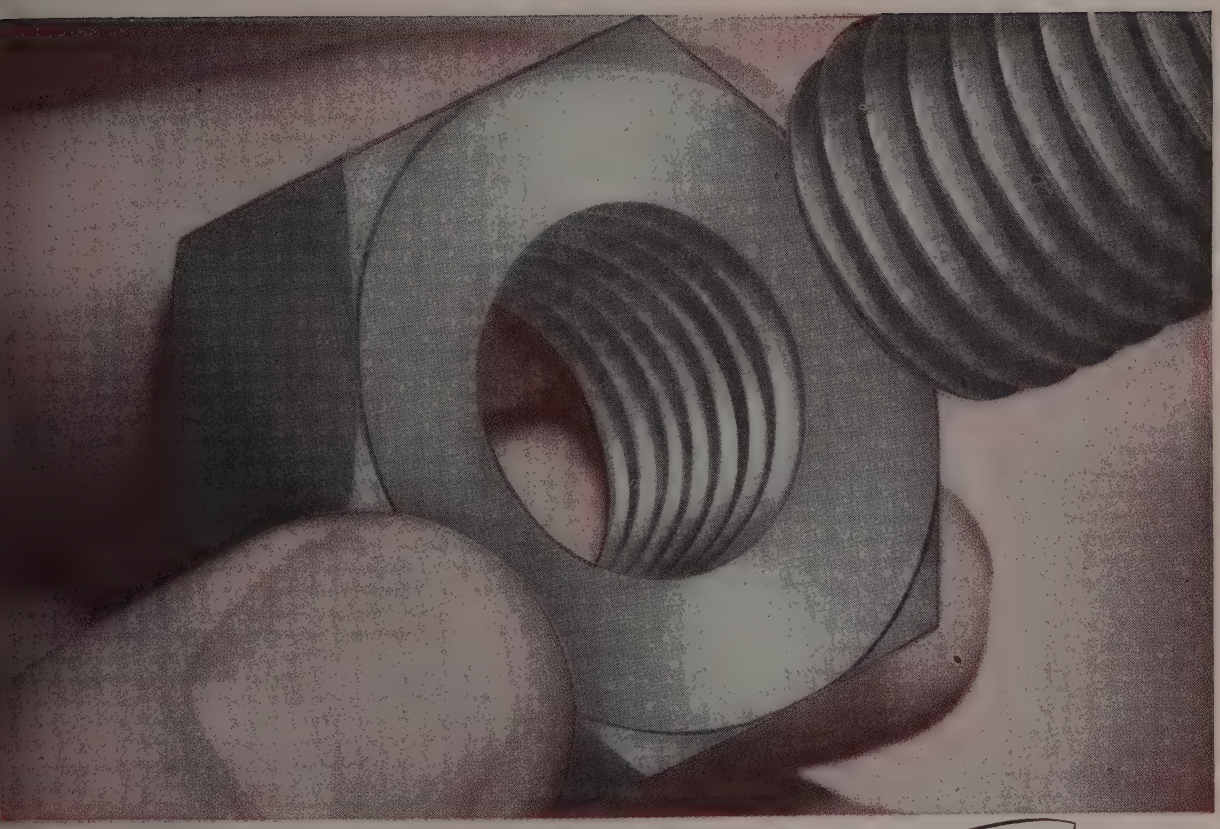
PROMPT PRESS DELIVERY: From Richmond, Calif., Vernon Press Division of Ran Corp., reports it is now producing a complete line of open-back inclinable punch presses featuring rigid one-piece frame of cast semisteel of exceptionally heavy section to assure protection against distortion from overloads. According to the company, prompt deliveries can be made on models with 30, 40, 50 and 90-ton capacities with flywheel drive. Backgeared drive 50 and 90-ton models also are to be available shortly.

HIGH-SPEED RESEARCH PROGRAM: Plan recently launched by both the National Advisory Committee for Aeronautics and the Office of Naval Research, Washington, is aimed toward stimulating college training of students in the field of high-speed flight. Crux of the plan is the design of a supersonic wind tunnel to serve as guidance in encouraging installation of similar equipment in universities throughout the country. The compressible-flow unit developed is not just a training gadget, but a full-fledged supersonic research tunnel, exceeding in speed many in use today by large research organizations. The equipment, according to NACA, will enable universities to train young persons to meet the serious shortage of scientists in the country caused by the war. It consists of two small wind tunnels, one a transonic unit 4 x 16 in. at the test section, the other a supersonic tunnel 4 in. square, both powered by a compressed air system. The two tunnels permit investigation over a speed range from three tenths to four times the speed of sound.

REFINED PLATING: Burned electrodeposits, nodules, exaggerated buildup of metal at corners or at sharp points are reduced or eliminated, and finishing costs are cut some 20 per cent by an electroplating process described recently by George W. Jernstedt, manager of electroplating projects for Westinghouse Electric Corp., Pittsburgh. In the process, current is reserved periodically to remove surplus metal, leveling peaks and polishing. Loose or surplus plate is "wiped" off by electrical backstrokes leaving only the smooth, tightly fastened atoms. The technique is similar to that of a painter who, after making a stroke with his loaded paint brush, draws the brush back again to remove ex paint and freeing the finish of br marks. Besides producing a plate is considerably smoother than the face of the material to which it applied, the process may be used build up successive layers of plate almost any desired thickness. Since metal surface is brightened by cur reversal, hand buffing or polishing reduced or entirely eliminated in s cases.

MECHANICAL REPORTER: Rece as a V-2 missile sped along at proximately 3800 mph, a new Gen Electric telemetering device transmit 28 items of information every thi fifth of a second. It gave personnel White Sands proving grounds meas ments of the rocket's acceleration, p tion of control vanes, fuel pressure well as scientific data on rocket temperature, the information being corded permanently on film at ground station. To transmit the in mation, since the system is mechanic commutated, each of a number of qu tities of interest is converted to a v age that varies between zero and plu v, and is connected to one segment stationary commutator. Twenty-e such channels are provided and a ro ing brush samples each of them 35 ti per second. Samples of the voltage converted to a pulse-width modula signal which is sent to the ground b 5-watt transmitter.

COST SAVING METHOD: Cost is duced about 45 per cent by the elim tion of alcohol in a new method of drolyzing ethyl silicate reported by bide & Carbon Chemicals Corp., York. Also it markedly reduces fire ards involved in the use of a vol solvent. The company disclosed that ethyl silicate is hydrolyzed in water vigorous agitation or by an emulsif agent and large amounts of a cata The aqueous solutions remain fluid several days and deposit adhesive s in the same manner as usual alc solutions. Cement or bond of pure s which results is insoluble in water, sistant to high temperatures, and no chemical action upon surrounding terial. Silica itself is affected only strong alkalies and hydrofluoric Ethyl silicate is used as a mold bi for precision casting of high-me metals and alloys. It also may be in surface hardening of graphite sand molds.



WHEN YOU LOWER THE COST OF USING FASTENERS . . . THAT'S **t.f.e.** *True Fastener Economy!*

Since the time and labor costs of assembling a nut on a bolt usually exceed the cost of the fasteners, it's *T*rue *F*astener *E*conomy to buy the brand that gives maximum speed and convenience in assembly.

RB & W *Nuts Save Assembly Time*

The care which RB & W takes to produce nuts with utmost accuracy and uniformity . . . pays off in terms of lower assembly cost. Careful selection of material; cold-punching that insures toughness, freedom from splitting, uniformity of size; repunching that guarantees concentricity of hole; burnishing that assures smoothness of all surfaces; tapping on machines of special design that provide accurate, clean threads . . . result in nuts that run on quickly and take severe wrenching in their stride.

You Get T. F. E. When You

1. Reduce assembly time to a minimum by savings through use of accurate and uniform fasteners
2. Make your men happier by giving them fasteners that make their work easier
3. Reduce need for thorough plant inspection, due to confidence in supplier's quality control
4. Reduce the number and size of fasteners by proper design
5. Purchase maximum holding power per dollar of initial cost, by specifying correct type and size of fasteners
6. Simplify inventories by standardizing on fewer types and sizes of fasteners
7. Save purchasing time by buying larger quantities from one supplier's complete line
8. Contribute to sales value of final product by using fasteners with a reputation for dependability and finish

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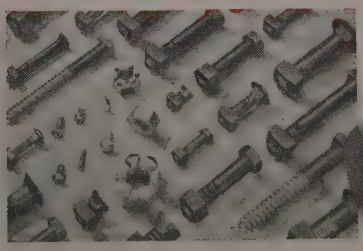
Plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Portland, Seattle. Distributors from coast to coast. By ordering through your distributor, you can get prompt service from his stocks for your normal needs. Also—the industry's most complete, easiest-to-use catalog.



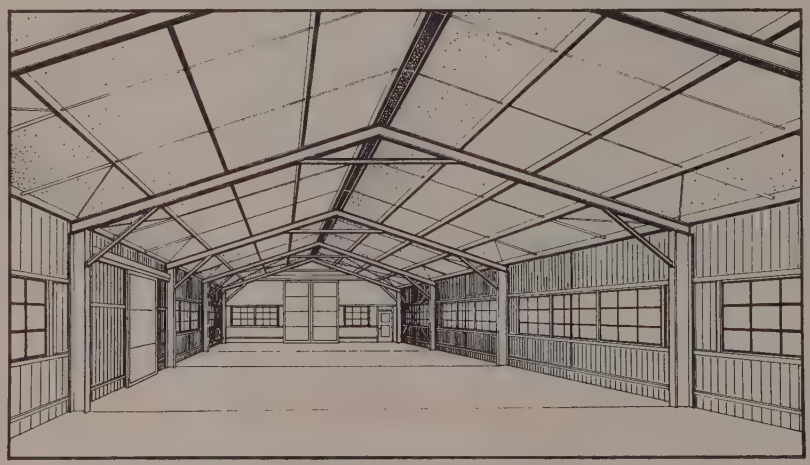
"MADE-TO-ORDER"

STEEL BUILDINGS

VIRTUALLY unlimited variations in size and arrangement of all-steel shop fabricated factory structures are possible with techniques developed by Luria Engineering Corp., New York. Production line economies are being applied to their construction, along with the additional economies of more flexible layouts and elimination of the expense of special engineering.

Buildings of this type may be expanded in both width and length according to the needs of the occupant, by adding more standard sections to either or both dimensions. Selection from standard alternates allows for the location of doors and sash of individual choice. Additional shop or office space may be provided the original building in the form of a lean-to, these again varying in size and location according to requirements.

Fabricated structures vary in width from 40 to 100 ft with lengths adjustable in 20 ft increments and inside clearance at eaves from 12 to 20 ft. Structural frame is said to have sufficient strength to support monorails or hoists up to 2000 lb capacity. The building itself can be fully insulated and its structural frame adapted for use with masonry or other building materials.



Partial fabrication of the structure is effected in the shop, with all field connections being bolted. Main frames of the buildings are fabricated of rolled structural sections in three pieces, shop welded at knee and ridge with splices at points of minimum stress. Galvanized and bonderized 22-gage corrugated steel sheets are used in the roof while siding is of 24-gage corrugated steel sheets, also galvanized and bonderized. Accompanying drawing shows structural details of building interior.

Both two-section end doors and one-section side doors are fabricated of welded structural steel frame and 18-gage cold formed sheet steel panels. Steel sash are furnished with operating sections and all wall framing is designed to accommodate single or multiple units.

Luria also is producing airport structures in the form of hangars, administration and utility buildings, all of which have the same flexibility and choice of alternates that are present in the industrial buildings.

Mobile Laboratory

(*Continued from Page* 89)

R_1, R_2, R_3, and R_4, connected to the power source E as shown in Fig. 4. For dynamic stress conditions, the bridge may be energized by a battery or other source of dc potential with excellent results; for static conditions or very slowly changing dynamic stresses (1 cycle per sec or less) an ac energizing source can be used. The Trailmobile people follow the latter course.

Normally, a sensitive current measuring device called a galvanometer is connected at the point G; because a permanent record is desired by the engineering staff at Trailmobile, the circuit at point G is modified somewhat to permit the transcribing on a moving chart the changes in resistance. However, for the purpose of explaining the operation of the bridge it will be assumed that a galvanometer is being used at G.

In using the bridge, resistance R_2 and R_4 are given suitable values; and then resistance R_3 is manipulated until the galvanometer G shows no deflection. When the bridge has been thus balanced, the resistance of R_1 can be found from the knowledge of the values of resistances R_2, R_3, and R_4. Without going into a more detailed explanation of the method underlying the derivation of the following formula, it can be stated simply that because the galvanometer shows no deflection the balanced circuit can be expressed mathematically as:

$$\frac{R_1}{R_2} = \frac{R_3}{R_4}$$

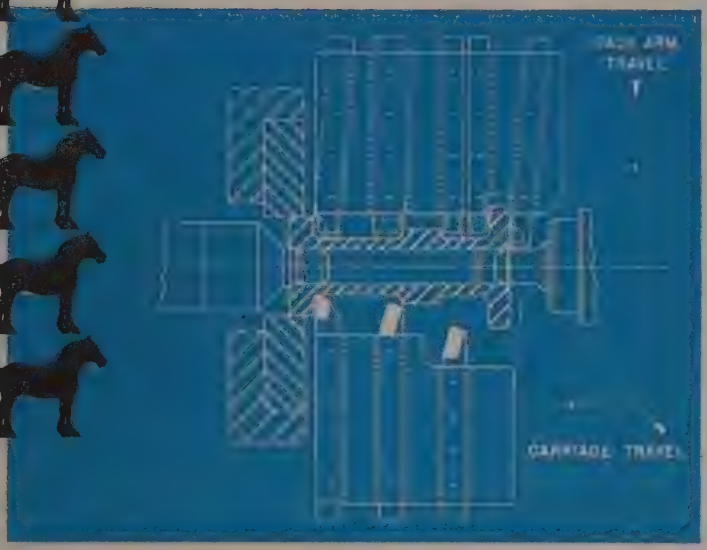
the resistance of the unknown is therefore

$$R_1 = \frac{R_2}{R_4} R_3$$

The value of the resistances R_2, R_3, and R_4 used in the bridges by Trailmobile engineers is 120 ohms. This value is used because the resistance of each gage is also approximately this amount. As mentioned previously, a galvanometer is not used to indicate the unbalance of the bridge; instead, a high gain amplifier is introduced at this point. Need for the amplifier becomes obvious when one stops to consider that a stress change of 90,000 psi in steel will cause a change of only 0.7 ohm in the resistance of the 120 ohm gage. The bridge output for one A-1 gage is approximately 10 millivolts for a strain of 0.001-in. per in. Therefore, in order that enough voltage is available to drive the pen and ink recording mechanism, the signal produced by the unbalance of the strain gage bridge has to be amplified. The Brush amplifier used in this set-up is suitable in a range of 1 to 100 cycles per sec, input voltage range is from 0.001 to 250 v (peak), input impedance is 10 megohms while the output impedance is adjustable to match the indicating device. These characteristics provide the amplifier with sufficient flexibility to meet all the problems encountered at Trailmobile.

The stepped-up voltage is then fed to the recording oscillograph. The Brush oscillograph has an essentially flat response for all frequencies from 1 to 100 cycles per second and is a dual channel unit carrying two pens. Pen-and-ink recording offers a number of advantages

How much HORSEPOWER are You using ?



1st. Turning Operation on an Automobile Transmission Counter Gear

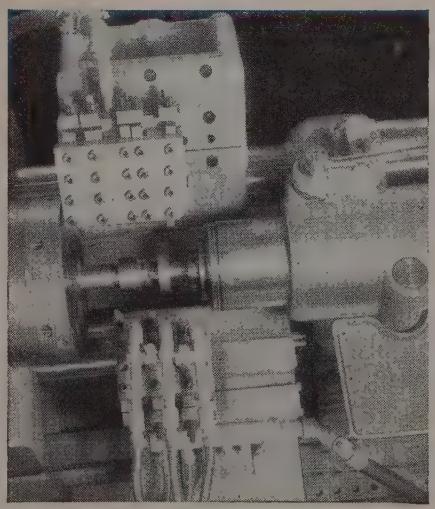
In this operation a 16" Fay Automatic Lathe transmits **40 HORSEPOWER** to remove **25 ounces of metal in 19 seconds** with carbide cutting tools.

Carbide cutting tools have increased horsepower requirements as much as 300 per cent. They have increased cutting speeds 200 to 500 per cent.

Be skeptical of the production efficiency of your metal turning equipment. The chances are that turning accounts for 25 per cent or more of all machining time in your plant—that this is your major production expense.

There are cases in our files of savings of hundreds of dollars a month in the manufacture of a single part by the efficient use of carbide cutting tools on Jones & Lamson machines. Our Turret Lathes and Fay Automatic Lathes are designed specifically for the most efficient use of these tools.

Send for our folder "Turning Automobile Counter Gears". Or better yet, telephone or write for a Jones & Lamson engineer who will be glad to consult with you on all phases of your metal turning problems.



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over other types of oscillographs, chief advantage being that the trace made by the pens is ready for study without need for further work on the record as is the case with the use of photographic film.

Before the bridge output that is recorded on the magnetic oscillograph can be put to use in stress analysis, the bridge-oscillograph system must be calibrated. Method of calibration employed at Trailmobile is of the type that permits the reading of the stress directly from the chart. Circuit employed for the calibration is the Wheatstone Bridge with a calibrating resistor placed in parallel with the wire gage. Fig. 5 is a diagram of this circuit with R_1 being the wire gage and R_c being the calibrating resistor which is connected with a switch across the gage.

However, before describing the actual procedure followed in calibrating the instrument, it might be well to review the theory underlying the formulation of the results.

It can be said that, in general, use of the instrument is based on the application of two principles: One that describes the behavior of materials under load, and the other that expresses a general property of engineering materials. This first principle states that strain, or deformation, is the change in the dimensions of the material which is proportional to the applied load or stress. If a bar of steel is attached by its upper end to a rigid support and a force of several thousand pounds is applied to its free end, the bar will stretch as the load is applied. The amount it lengthens per unit length of the bar is called the total strain. This change in the dimensions of the material is expressed in equation form as

$$\epsilon = \frac{e}{L}$$

where ϵ is strain

e is total elongation

L is length over which elongation occurs.

For our purpose, the equation can be written in the form

$$\epsilon = \frac{\Delta L}{L}$$

since Δ L represents change in length.

Now, since the ratio states that Δ L/L is the unit change in length of a material subjected to a force, it can therefore be used with equal validity to express the strain of a wire gage. In the case of its use with the gage it forms one of the members of the ratio known as the gage or sensitivity factor. This gage factor represents the ratio of the unit change in resistance of the gage to the unit change in its length and is written as

$$f = \frac{\Delta R/R}{\Delta L/L}$$

Gage factor for the A-1 type is approximately 2.00.

As was stated previously, the expression $\Delta L/L$ is identical with the strain induced in the gage and, therefore, in the body being tested. Knowing the gage factor and the change in resistance, which after all is the property being measured, the value of the expression $\Delta L/L$ is quite easily obtained. Thus

$$\text{Strain} = \Delta L/L = \frac{\Delta R/R}{f} \qquad (1)$$

To find the stress another familiar equation is brought into use, namely

$$E = \frac{S}{\epsilon} \qquad (2)$$

where E is the modulus of elasticity

S is the unit stress

ϵ is the unit strain corresponding to S.

The property expressed in (2) is the modulus of elasticity or Young's Modulus, and serves as a measure of stiffness or resistance to deformation.

Inasmuch as ϵ and $\Delta L/L$ are an identical quality, the value found for $\Delta L/L$ in equation (1) can be substituted for ϵ in equation (2). Therefore

$$\text{Stress} = S = E \cdot \Delta L/L \qquad (3)$$

Equation (3) can be simplified somewhat. By reducing the complex fraction of (1) to the form

$$\Delta L/L = \frac{\Delta R}{R} \cdot \frac{1}{f}$$

and then combining this equation with (3), a more conveniently workable version of (1) and (2) is obtained, namely

$$S = E \cdot \frac{\Delta R}{R} \cdot \frac{1}{f}$$

from which the following is obtained

$$S = \frac{\Delta R}{R} \cdot \frac{E}{f} \qquad (4)$$

Thus, since both E and f are known, all that needs to be done to calibrate the system is to measure the output of the bridge circuit before and after a load has been applied from which the resistance change, and thereby the stress, is determined.

Coming back to Fig. 5, it is evident therefore that by switching in R_c, a change will be produced in the output voltage. The deflection that is produced on the oscillograph chart when the calibrating resistor is shunted across the strain gage corresponds to a certain stress which (according to Brush Bulletin Vol. 1, No. 17) can be calculated using

$$S = \frac{R_1(R_1+R_2)}{R_1R_2+R_c(R_1+R_2)} \cdot \frac{E}{f} \qquad (5)$$

When the values are determined for (5), then $\Delta R/R$ has been found because (5) is identical with equation (4). (The afore-mentioned bulletin, incidentally, gives a comprehensive mathematical s lution for many of the more comm circuits employing resistance gages.) Am plifier gain may now be adjusted so th the stress obtained with the calibratin resistor produces an oscillograph defle tion whose chart width corresponds wit a convenient unit stress.

In the Trailmobile application, for e ample, a value for ΔR of 0.16 ohms wa obtained using a calibrating resistor c 89,000 ohms and a strain gage of 119.7 ohms. The modulus of elasticity or for steel is 30×10^6 psi, while the f valu as furnished by the manufacturer for th strain gage employed is 2.06. Then fro (4),

$$S = \frac{0.16 \cdot 30 \cdot 10^6}{119.72 \cdot 2.06} = 19{,}500 \text{ psi}$$

Although there are several methods o calibrating the oscillograph, the followin was used: The bridge balancing contr was adjusted for a zero oscillograph de flection, the calibrating resistor wa shunted across the strain gage, and th amplifier gain was adjusted to a tot oscillograph deflection of 15 lines. Bridg balance control was adjusted advancin the oscillograph deflection to 30 lin overall, the calibrating resistor was re moved and the oscillograph deflectio dropped to 15 lines. The difference deflection now represents 19,500 psi an the 15 line deflection remaining repre sents the unstressed condition. The stre record for each graph division increas of deflection is therefore 19,500 psi d vided by 7.5 (which is one-half th change of total chart deflection) or 260 psi. This would be compressive stress; th This would be compressive stress; th tensile stress would register in corr sponding increments per graph divisi but would make a sweep record of d creasing width with increasing tensio Thus, the system is calibrated so that stress of 2600 psi will cause a 1 mm pe deflection, and an unknown stress w produce a proportional deflection who value can be found by multiplying th change in chart deflection by 2600.

Considerable benefits have result from this method of testing. In add tion to determining the actual workin stresses of each part tested, the stre measuring equipment tells the enginee what additional stresses are being im posed as a result of road shock, bra applications, jacknifing, etc. In the pa these latter stresses have been based empirical formulas which have not alwa been accurate. Knowing exactly wh these stresses are, it is possible to fi the proper factor of safety for each trail part used in the construction of trailer. This is of vital importance b fore improvements in design can made intelligently.

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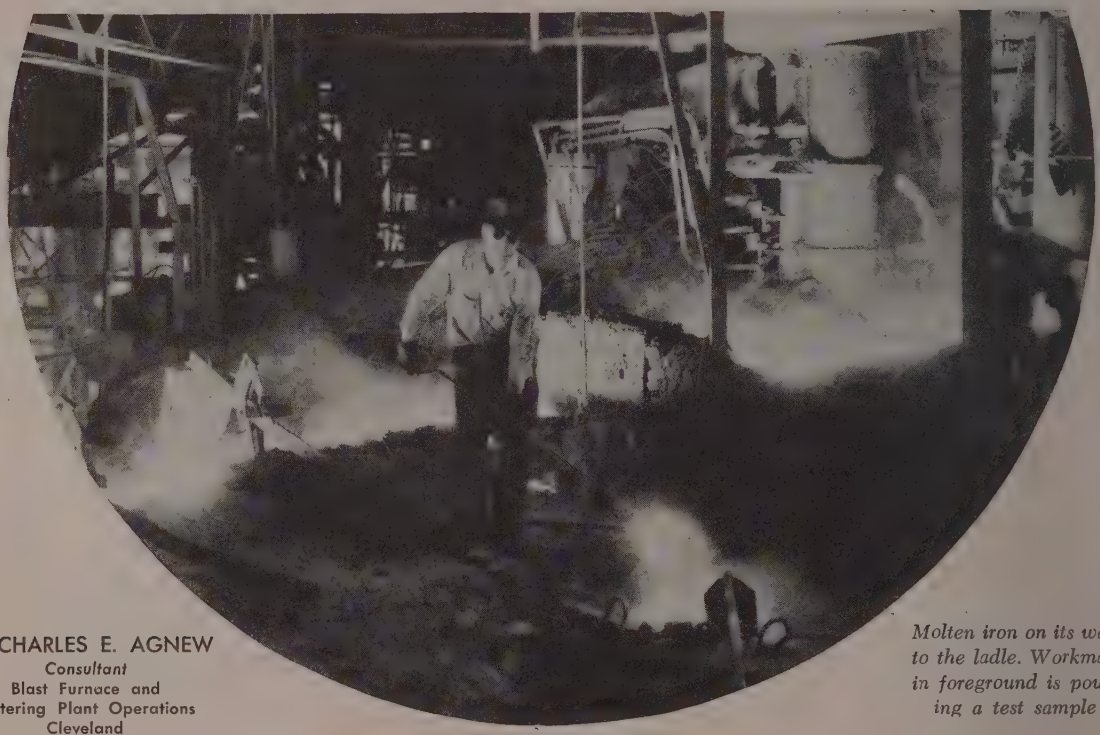
Thermal Requirements for Blast Furnace Operation



Molten iron on its way to the ladle. Workman in foreground is pouring a test sample

By CHARLES E. AGNEW
Consultant
Blast Furnace and
Sintering Plant Operations
Cleveland

High production of flue dust is believed to be attributed to thermal conditions in the shaft of the furnace rather than to the fineness of raw materials. Factor for determining amount of heat consumed in reduction of iron from the silicate is computed in this the second of a series

CHARACTER of raw materials used, amount of thermal work required in the shaft operation, and ability of the materials to *recover* heat, as pointed out in a previous article[6], are the factors which determine the permissible blowing rate since it is the blowing rate which determines the amount of heat delivered to the shaft, and thus the ability to maintain the necessary balance between the low-temperature work of the shaft and the high-temperature work of the bosh and hearth. If the amount of heat delivered to the shaft is greatly in excess of the amount required to do the shaft work the objectionable thermal condition created there is of much greater concern than the production of dust since the production of dust is incidental to it.

When the heat requirements of the shaft operation are greatly reduced (as indicated by the material analyses of Table II in the previous article, and by the weight of limestone used) a reduction of heat delivery to the shaft becomes imperative and when reduced to a suitable amount volatile free fines are in advantage in the *recovery* of heat. In short, it is believed an objectionable amount of flue dust production is frequently due more to an objectionable thermal condition in the furnace shaft than it is to the property of fineness in materials, always recognizing the fact that for each operating condition there is a maximum percentage of fines permissible. In a previous article[6] 93 lb dust per 2240 lb of iron for a one year sinter burden operation was given, with a best month of 40 lb, but during that year the percentage of raw concentrate charged with the burd varied as other conditions permitted.

Pounds of scrap used in the burden culation was selected because it is reas ably representative of the amount of sc used in many furnace operations and the purpose of comparison with "South" heat balance, as will be sho later.

The coke figure of 1350 lb was selec as representative of good basic pract In the author's experience[7] the low monthly coke figure ever obtained 1333 lb per 2240 lb of iron and one w of that month was 1299 lb, which c verted to the net ton (2000 lb) basis c rently used becomes 1190 and 1159 respectively. Further comments u these figures will be made later.

The stone figure of 300 lb is possi only because of the low coke ash,

[6]All references are presented at the end of this installment.

low gangue content of the principal iron-bearing materials, and the excess lime (CaO) of the open-hearth slag and the ferromanganese slag charged. The affect of this low weight of stone upon the heat requirements of the furnace shaft operation will be discussed later.

Top gas analysis, upon which the heat balance is based, is unusual for such analyses. In actual practice the total of carbon monoxide (CO) and carbon dioxide (CO_2) in excess of 40 per cent were consistently obtained in daily spot samples over a long period of time and are therefore used in the theoretical heat balance calculation. Reference to this gas analysis was made in a previous article[8].

Affect of iron silicates upon the fuel economy of the blast furnace operation is one of the controversial subjects concerning the use of sinter in the furnace burden. In a previous article[6] it was emphasized that the affect of the silicate formation upon the particle size of the sinter is of greater concern in the *recovery* of heat, which makes the reduction of the iron possible, than it is in the amount of heat required for the reduction.

The Mathesius procedure for calculating the heat balance does not provide a factor for determining the amount of heat consumed in the reduction of iron from the silicate because none of the iron of his calculation was reduced from that stage of existence. Since it is known that iron silicates exist in sinter it was necessary in this article to determine such a factor.

Richards[9], in his blast furnace heat balance calculation, says that if part of the iron in the raw materials is charged as silicate an additional amount of heat will be required for reduction, equal to that needed to separate the iron oxides from their combination with silica. To illustrate his reasoning he calculates the bi-silicate slag;

(FeO, SiO_2) = 8900 calories
1 kg of SiO_2 = 148 calories

which is equivalent to 266 Btu per lb of SiO_2. He adds further that when the iron silicate bearing material contains more Fe than the calculation shown we can best make allowance for the heat required to set free the silica. It is necessary, therefore, to take the amount of silica in the iron silicate bearing material charged, and allow, as necessary for its decomposition into FeO and SiO_2 148 calories for each unit weight of SiO_2 contained.

The iron silicate calculation by Richards is a simple combination of two constituents only but in the sintering of iron-bearing materials for blast furnace use the complex combinations of several constituents, such as the oxides of Mn, Al, Ca, Mg, with Fe and SiO_2, are the more common. It is known that a silicate with a double base will have a lower fusion temperature than one of a single base,

TABLE III—CALCULATION OF CONSTITUENTS BASED UPON ATOMIC WEIGHTS

							Per cent			
⅓	Fe	O	+	Si	O_2	=	Fe	+ O +	SiO_2
	56	16		28	32		42.42	12.12	45.45
⅓	Fe_2	O_3	+	Si	O_2	=	Fe	+ O +	SiO_2
	112	48		28	32		50.91	21.82	27.27
⅓	Fe_3	O_4	+	Si	O_2	=	Fe	+ O +	SiO_2
	168	64		28	32		57.53	21.92	20.55

$$Fe = \frac{42.42 + 50.91 + 57.73}{3} = 50.29\%$$

$$O = \frac{12.12 + 21.82 + 21.92}{3} = 18.62\%$$

$$SiO_2 = \frac{45.45 + 27.27 + 20.55}{3} = 31.09\%$$

$$\frac{\text{91.00 lb } SiO_2 \text{ in sinter}}{\text{31.09\% } SiO_2 \text{ in silicate}} = \text{292.69 lb Fe silicate compound in sinter}$$

292.69 × 50.29 = 147.19 lb Fe
292.69 × 18.62 = 54.50 lb O
292.69 × 31.09 = 91.00 lb SiO_2
292.69 lb Fe silicate compound

48 lb Fe in o.h. slag + 5 lb Fe in ferromanganese slag gives 53 lb Fe existing as Fe silicate in slag. Assumed to exist in the same ⅓ proportions as the sinter, therefore:
53 lb Fe ÷ 50.29 per cent Fe gives 105.67 lb Fe silicate compound in slags.

105.67 × 50.29 = 53.14 lb Fe
105.67 × 18.62 = 19.68 lb O
105.67 × 31.09 = 32.85 lb SiO_2
105.67 lb Fe silicate in slags

Fe as Fe silicate: 147.19 lb from sinter + 53.14 lb from slags gives a total of 200.33 lb.
SiO_2 as Fe silicate: 91 lb from sinter + 32.85 lb from slags gives a total of 123.85 lb.

Heat required to reduce: Btu
FeO to 1 lb of Fe = 2145
Fe_2O_3 to 1 lb of Fe = 3240
Fe_3O_4 to 1 lb of Fe = 2970
Total 8325
Average 2775

SiO_2 in sinter and slags as Fe silicate:
123.85 lb × 266 Btu = 32,944.10 Btu
200.33 lb × 2775 Btu = 555,915.75 Btu
588,859.85 Btu

Heat required to reduce Fe silicate to 1 lb Fe:
$$\frac{\text{588,859.85 Btu}}{\text{200.33 lb Fe}} = \text{2939 Btu}$$

and therefore, it is a reasonable assumption that in many silicate combinations the separation of the silica could be effected with less than 148 calories per kilogram of silica.

Since many investigators have found evidence of a change in the existing forms of iron oxide during the sintering operation such changes therefore can be accepted as usual rather than unusual but the only change which could be of benefit to the blast furnace operation would be a partial reduction in the amount of oxygen in the oxide. Since carbon of the sintering mix is burned to carbon dioxide (CO_2) it is a reasonable assumption that there is opportunity during the sintering action for some oxidation as well as for deoxidation. But accepting the fact that changes in the stage of the oxide occur the important consideration appears to be the probability or improbability of controlling the changes to a preferred stage of oxidation in a commercial sintering operation and the economic value of the control even if possible to effect it.

It is known that many of the eastern magnetite ores (Fe_3O_4) contain some percentage of hematite (Fe_2O_3) as do other iron-bearing materials frequently sintered with the magnetite concentrates.

Because of the several factors mentioned in the preceding paragraphs the percentage of the different stages of iron oxide, and the composition of the iron silicates in the commercial sinters produced are variables and it is therefore necessary to use reasonable assumptions for these percentages. For the purpose of this calculation it is assumed that all of the silica (SiO_2) in the sinter exists as some form of iron silicate and that the stage of oxidation of the iron in the silicate is in equal portions of 1/3 FeO + SiO_2; 1/3 Fe_2O_3 + SiO_2; and 1/3 Fe_3O_4 + SiO_2. From this premise can be calculated 91.00 lb silica in the sinter, all in the form of iron silicate. Based upon atomic weights the percentages of the respective constituents to be separated can be determined, as shown in Table III.

Since virtually all of the manganese in the mix is in the open-hearth and ferromanganese slags we must assume that it also exists as a silicate (MnO, SiO_2) and from Richards[9] 162 Btu is required to separate 1 lb of silica from the manganese silicate shown. Based upon atomic weights Mn represents 41.98 per cent of the manganese silicate, $MnSiO_3$, and since 46.9

TABLE IV—ORIGIN OF IRON CONTENT

Material	Sinter	Concentrates	O.H. slag	Ferro-Mn. slag	Roll scale	Scrap	Coke
% Fe	61.43	64.00	16.00	2.00	67.00	85.00	0.80
Lb per ton product	1400	1200	300	250	300	350	1350
Lb Fe per ton product	860.0	768.0	48.0	5.0	201.0	297.5	10.8
Fe to F.D. & scrap 4.8% Fe to product	818.7	731.1	45.7	4.7	191.3	283.2	10.3

lb of manganese are shown in the burden calculation, 42.4 lb of which came from the sinter and the slags charged, there must have been 42.4 ÷ 41.98 or 101 lb manganese silicate in burden.

According to Mathesius[2], 2970 Btu are required to reduce MnO to 1 lb Mn; therefore, to reduce the manganese silicate to 1 lb Mn would require 2970 + 162 or 3132 Btu.

Since it is known that some Fe in the eastern magnetite (Fe_3O_4) ores exists as hematite (Fe_2O_3), and scrap was a part of the iron-bearing materials, the percentages of the stages of oxidation of the Fe must be determined for the heat balance calculation. This follows:

350 lb scrap charged — 67 lb produced = 283 lb to pig.
860 lb Fe in sinter + 768 lb in concentrates gives a total of 1628 lb Fe.
1628 × 3.00 (% Fe assumed to exist as hematite) = 48.84 lb Fe as Fe_2O_3.

	Lb
Fe from scrap as Fe	283.00
Fe from stock in iron silicates	200.33
Iron from stock in hematite	48.84
Total	532.17
Fe in pig iron	2085.00
Iron existing as shown above	532.17
Iron existing as magnetite	1552.83

East Heat Balance: The South heat balance was based upon exhaustive research into the blast furnace chemical reactions, conducted by Bureau of Mines scientists, and the data compiled are therefore much more complete and accurate in detail than it is for the North and East calculations. It is therefore entirely reasonable that some discrepancies occur in the North and East calculations which are not accounted for but for practical purposes of comparison they serve their purpose.

The East calculation is shown in two ways, (1), as determined with the Mathesius[2] procedure, based upon carbon combustion, and (2), as checked with the Johnson[1] procedure, based upon the oxygen available for carbon combustion.

Mathesius Procedure:

Analysis of Top Gases (1)

Gases	By volume	By weight
CO_2	14.50	21.13
CO	28.00	25.96
H_2	0.50	0.03
N_2	57.00	52.88
	100.00	100.00

On the basis of the foregoing data 1 lb of this gas contains;

$$\frac{21.13 \times 3}{100 \times 11} = 0.0576\text{-lb C as } CO_2$$

$$\frac{25.96 \times 3}{100 \times 7} = 0.1112\text{-lb C as CO} \quad (2)$$

This carbon originated from:

1. The carbon charged, minus the amount of carbon transferred to the iron and the amount carried off with the flue dust.

2. The CO_2 content of the raw materials.

3. The total amount of coke charged in the calculation is 1350 lb which analyzed:

Fixed carbon	90.00
Ash	8.65
Sulphur	0.85
Phosphorus	0.008
Volatile matter	0.90

The coke as weighed averaged 3.00 per cent moisture, making the weight of dry coke charged 1310 lb. The amount of fixed carbon charged is then 1310 × 90 ÷ 100 or 1179 lb.

From this total is deducted the carbon carried off with the iron, which is calculated as follows: The carbon content of the metal was 4.00 per cent and 2240 lb of metal was produced, beside 67 lb of scrap (ladle skulls and pig machine scrap) or a total of 2307 lb. Therefore 2307 lb of iron (2240 plus 67) was carried off which is equivalent to 2307 × 4.00 ÷ 100 = 92.28 lb of carbon.

Beside the regular burden, the charge received 350 lb of scrap which contained,

67 lb iron scrap × 4.00% C = 2.68 lb carbon

283 lb steel scrap × 0.15% C = 0.42 lb carbon

Therefore the net amount of coke carbon carried off with the metallic product is 92.28 — 3.10 or 89.18 lb carbon. In the burden calculation the amount of flue dust loss was 90 lb. Since the average carbon content of the flue dust was 10 per cent the amount of carbon carried from the furnace with the dust was 90 × 10 ÷ 100 or 9 lb. Consequently the amount of carbon gasified in the furnace was

$$1179 - (89.18 + 9.00) = 1080.82 \text{ lb C} \quad (3)$$

The only burden constituent containing CO_2 in large quantities was limestone of which 300 lb was charged. It contained 44.85 per cent CO_2 making the CO_2 charged with the limestone:

$$\frac{300 \times 44.85}{100} = 135 \text{ lb } CO_2 \quad (4)$$

which is equivalent to,

$$\frac{135 \times 12}{44} = 37 \text{ lb C} \quad (5)$$

Total amount of carbon which escaped from the furnace as CO and CO_2 is therefore (see 3 and 5), 1080.82 + 37 or 1117.82 lb. With each pound of the top gases containing 0.1688 lb of carbon (see 2), the total weight of the dry gases for the calculation is 1117.82 ÷ 0.1688 or 6622 lb.

Total weight of water charged with ore, coke, and limestone, and leaving the furnace with the gas, was 106.2 lb, according to the analysis of the burden constituents. The nitrogen content of the dry gases (see 1) originated exclusively from the blast, and the nitrogen content of air being known, the weight of dry air which entered into the furnace through the tuyeres was (6622 × 52.88) ÷ 77 = 4548 lb.

Average moisture content of the atmosphere was 5.49 grains per cu ft at 70° F, making the weight of natural air blown into the tuyeres 4548 + 47.6 or 4595.6 lb blast.

Slag volume according to the burden calculation was 40.08 per cent making the amount of slag produced 898 lb.

Weight of materials passing through the furnace per charge is as follows:

	Lb/ton of product incl. scrap output (6)
Product (incl. scrap) 2307 lb	
Burden	3800
Limestone	300
Coke	1350
Slag	898
Flue dust	90
Blast (dry)	4548
Moisture in blast	47.6
Top gas (dry)	6622
Moisture in top gas	106.2

Analysis of Iron

	Per cent
Carbon	4.00
Silicon	1.00
Sulphur	0.030
Phosphorus	0.300
Manganese	1.50
Iron	93.17

The iron content originated from the burden constituents shown in Table IV.

Total iron to product was 2085 lb. Consequently the iron content of 1 ton (2240 lb) of product originated from the following composition and stages of oxidation:

	Lb
Fe	283
Silicates	200.33
Fe_2O_3	48.84
Fe_3O_4	1552.83

In the same manner 1 gross ton of product contained 1.50 per cent, or 33.7 lb Mn which had been reduced from manganese silicate. Phosphorus of the product amounts to 6.73 lb and has been considered all reduced from P_2O_5. The 1.00 per cent silicon is equivalent to 22.4 lb per gross ton of product reduced from SiO_2.

Heat Production: Total weight of carbon contained as CO_2 in the top gases per pound of product is (see 2 & 6):

$$0.0576 \times 6622 = 381.43 \text{ lb C} \quad (7)$$

Weight of carbon per ton of product equivalent to the amount of CO_2 originating from the limestone and contained in the top gases is (see 5 and 6):

$$\frac{(37 \times 2240)}{2307} = 35.5 \text{ lb} \quad (8)$$

Deducting item (8) from (7) gives 377.93 lb of coke carbon burned to CO per ton of product.

One lb of carbon through combustion to CO_2 generates 14,543 Btu. The 377.93

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TABLE V—HEAT CARRIED OFF BY TOP GASES

(Gas analysis	×	weight of gas	×	top temperature	×	specific heat	=	Btu)
CO_2 0.2113	×	6622	×	350	×	0.2169	=	106,222
CO 0.2596	×	6622	×	350	×	0.2426	=	145,966
H_2 0.0030	×	6622	×	350	×	3.4090	=	23,703
N_2 0.5288	×	6622	×	350	×	0.2438	=	298,801
								574,692

lbs generated, therefore, gives 377.93 × 14,543 or 5,496,236 Btu.

The amount of carbon per ton of product burned to CO is (see 2 and 6): 0.1112 × 6622 or 736.36 lb.

One lb of carbon through combustion to CO generates 4446 Btu. The 736.36 lbs generated therefore, gives 736.36 × 4446 or 3,273,857 Btu.

Specific heat of the air blast being 0.248 and the hot blast temperature 1550° F the heat brought into the furnace with the blast per ton of product is 1550 × 0.248 × 4548 or 1,748,251 Btu.

In the same manner the amount of heat brought into the furnace per ton of product with the moisture (specific heat 0.49) content of the blast is 1550 × 0.49 × 47.6 or 36,152 Btu.

Heat Consumption: Thermal requirements to reduce various items are:

	Btu
Fe silicate to 1 lb Fe	2,939
Mn silicate to 1 lb Mn	3,132
Fe_2O_3 to 1 lb Fe	3,240
Fe_3O_4 to 1 lb Fe	2,970
MnO to 1 lb Mn	2,970
SiO_2 to 1 lb Si	14,090
P_2O_5 to 1 lb P	10,620

The reduction of 1 gross ton (2240 lb) of product therefore required:

	Btu
200.22 lb Fe from Fe silicate	588,770
1552.83 lb Fe_3O_4	4,611,905
48.84 lb Fe_2O_3	158,242
33.70 lb Mn from Mn silicate	105,548
6.73 lb P from P_2O_5	71,478
22.40 lb Si from SiO_2	315,616
Total	5,851,554

Weight of CO_2 produced by the calculation of carbonates per ton of product is 135 lb (see 4 and 6), all of which was contained in the burden in the form of $CaCO_3$. Heat necessary to decompose $CaCO_3$ into CaO and CO_2 is 1830 Btu per pound of CO_2. Driving off the 135 lb required 135 × 1830 or 247,050 Btu.

Amounts of heat carried from the furnace by the iron and the slag are determined by calculation to be 512 and 888 Btu respectively.

Heat carried off by the iron per ton of product is 512 × 2240 or 1,146,880 Btu, and by the slag 888 × 898 or 797,424 Btu.

Dissociation of the moisture as carried into the furnace with the blast requires per pound of water vapor, 5760 Btu; per ton of product the heat required for this reaction was 47.6 × 5760 or 274,176 Btu (see 6).

Dry top gases carried off the amounts of heat per ton of product as shown in Table V. (The top temperature was 350° F, (see 1) for gas analysis and (6) for weight of gas).

Moisture carried out with the top gases entered the furnace at a temperature of 62° F, i.e., with a heat content (see 6) per ton of product of (62 — 32) × 106.2 = 3186 Btu.

Since the moisture was heated in the furnace to 212° F, and evaporated, and the resulting steam superheated to 350° F, the heating of the water required (212 — 32) × 106.2 = 15,930 Btu.

Evaporation required 964.8 × 106.2 = 102,462 Btu.

Superheating required 0.48 × (350 — 212) × 106.2 = 7035 Btu.

Therefore the total heat carried off by the top gases per ton of product was 15,930 + 102,462 + 7,035 or 125,427 Btu.

Summary of Heat Produced

Source	Btu	%
CO_2	5,496,236	52.08
CO	3,273,857	31.02
Hot blast (dry)	1,748,251	16.56
Blast moisture	36,152	0.34
Total	10,554,496	100.00

Summary of Heat Consumed

Source	Btu	%
Reduction of Fe	5,358,917	50.78
Reduction of MnO, P_2O_5, SiO_2	492,637	4.67
Carbonate calcination	247,050	2.33
Moisture dissociation	174,176	2.59
Carried off with:		
Iron	1,146,880	10.87
Slag	797,424	7.57
Dry gas	574,692	5.44
H_2O in gas	125,427	1.19
	9,017,203	85.44
Radiation, cooling water and unaccounted for	1,537,293	14.56
Total	10,554,496	100.00

Johnson Procedure:

Carbon in the gaseous form has a volume of 29.85 cu ft per lb of carbon. Total carbon gasified was 1117.83 lb ÷ 2307 or 0.484 lb carbon per lb pig and scrap.

Carbon gas was 0.484× 29.85 or 14.45 cu ft per lb of iron. Total carbon gas was 14.50 per cent CO_2 + 28.00 per cent CO or 42.50 per cent.

14.45 ÷ 0.425 = 34.00 cu ft of gas per lb of iron. Of the top gas 57.0 per cent was N_2. So that 57.0 × 34.0 gives 19.38 cu ft of N_2 in the top gas.

19.38 cu ft of N_2 ÷ 79.3 per cent N_2 in air gives 24.4 cu ft of blast per lb of iron. This weighs 0.0807-lb at 32° F, or 24.4 × 0.0807 or 1.97 lb blast per lb of iron. 1.97 × 23.0 (% 0 in air) gives 0453-lb oxygen from the blast.

Oxygen from the Charge	Lb
200.33 lb Fe as iron silicate, 43/112 × 200.33	76.72
1552.83 lb Fe as Fe_3O_4, 64/168 × 1552.83	591.63
48.84 lb Fe in Fe_2O_3, 3/7 × 48.84	2.09
33.7 lb Mn as MnO, 16/55 × 33.70	10.81
6.73 lb P as P_2O_5, 80/62 × 6.73	8.68
22.40 lb Si as SiO_2, 32/28 × 22.40	25.60
Total	715.53

715.53 lb 0 ÷ 2240 lb Fe = 0.3194-lb 0 per lb of iron from charge. 32/44 × 135 = 98.14 lb 0 per gross ton of iron.

98.14 lb 0 ÷ 2240 lb Fe = 0.0438-lb 0 per lb of iron from limestone.

47.8 lb of water in blast per gross ton of iron. 16/18 × 47.8 = 42.45 lb 0 from H_2O per gross ton of iron.

42.45 lb 0 ÷ 2240 lb iron = 0.0189-lb 0 per lb of iron.

Source	Lb O/lb Fe
Oxides of charge	0.3194
Carbonates	0.0438
Blast	0.4530
Moisture in blast	0.0189
Total	0.8351

Total oxygen required to oxidize 0.484-lb carbon to CO is 0.484 × 11/3 or 0.645-lb. This leaves 0.8351 — 0.6450 or 0.1901-lb oxygen to convert CO to CO_2.

C to CO (0.6450 — 0.1901 = 0.4549) × ¾ = 0.3412-lb carbon.

C to CO_2 requires 1901 × ¾ = 0.1426-lb carbon.

12/44 × 135/2240 = 0.0164-lb 0 from carbonate as CO_2 and therefore generates no heat therefrom.

0.1426 — 0.0164 = 0.1262-lb C to CO_2; and 0.4840 — 0.1426 = 0.3414-lb C to CO.

	Btu/lb Fe
0.1262-lb C × 14,750	1861
0.3414-lb C × 4,375	1494
From blast and moisture	796
Total	4151

4151 × 2240 = 9,298,240 Btu/gt Fe

Specific heat of top gas	0.0205
Top gas, cu ft/lb Fe	34.0
Temp top gas, °F	350

34.0 × 350 × 0.0205 = 244 Btu/lb Fe

Sensible Heat of Water Vapor:

106 ÷ 2240 = 0.047 × 0.46 × 350 = 7.6 Btu per lb of iron. 244 + 7.6 = 251.6 Btu per lb of iron.

Net heat consumed therefore is 4151 — 251.6 = 3899.4 Btu per lb of iron, or 3899.4 × 2240 = 8,734,656 Btu per gross ton of iron.

Comparison of Procedures

	Btu per gt iron	
	Produced	Consumed
Mathesius	10,554,496	9,017,203
Johnson	9,298,240	8,734,656
Difference, per cent	11.9	3.1

Considering the incompleteness of the data available and the many opportunities for error in the calculations the foregoing check appears to be satisfactory, particularly in the amount of heat consumed.

(Continued in next week's issue)

(2) "Use of High Blast Heats in Mesabi Practice" by Walter Mathesius, AIME Yearbook, 1915.

(5) "Principles of Iron Ore Beneficiation," Charles E. Agnew, STEEL, Nov. 26, 1945, p. 124.

(6) "Benefits from the Use of High Concentrates in a Blast Furnace Operation," AIME, 1938.

(7) "Smelting Sinter in the Blast Furnace," by Charles E. Agnew, STEEL, Feb. 15, 1943, p. 100.

(8) "Sinter and Blast Furnace Thermal Principles," by Charles E. Agnew, STEEL, Oct. 4, 1943, p. 110.

(9) "Metallurgical Calculations," by J. W. Richards.

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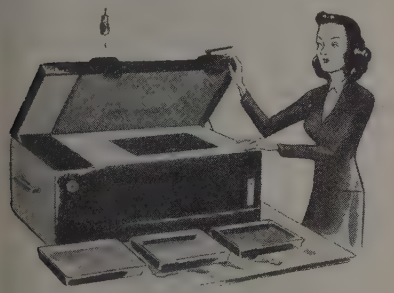

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Products Available This Week			B	C	D	E	F	G	
Cat. No.	Description	List Price							
C-5009	Thrust Bearing Pyrex Cyl.	$ 1.35							
C-7416	Ball & Housing Assembly	3.80							
C-6404	Bearing Assembly	5.50							
C-7250	Gear-Spur-18 Tooth	7.50							
C-7150	Gear-Spur-25 Tooth	8.00							
A-5121	Lamp-Fluorescent-Ballast	1.80							
A-5120	Lamp-Fluorescent-Daylight	1.00							
A-5124	Lamp-Fluorescent-Starter	.35							
A-4324	Panel Bolt Guide	2.25							
C-7274	Spring-Foot Pedal Lever	[illegible]							
C-6185	Spring-Idler Roller	.15							
C-7552	Spring-Tenter Roller	.25							
C-7250	Sprocket Assembly-17 Teeth	5.50							
C-6589	Belt — Auxiliary	31.50							
A-4370	Belts — Main Perforated	31.40							
C-6425	Cylinder & Ring Assembly	[illegible]							
C-8010	Valve-Drain-Complete	3.15							
C-7020	Sprocket-16 Teeth	2.60							
C-7120	Pipe Drain Valve	4.50							
C-7047	Stem-Drain	3.00							
C-7020	Cleaners-Drain Valve-Assem.	1.35							
C-6437	Bearing-Ball-Bore 3/8"	1.25							
C-8040	Bearing-Ball-Bore 1/2"	1.20							
C-7410	Bearing-Ball & Housing Assem.	7.15							
C-7080	Air Filter	4.00							
C-6089	Bolt (Tenter Screw)	4.60							
C-7003	Coupling	3.15							
A-5215	Rear Box	65.00							
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Magnesium Alloys

(*Continued from Page* 91)

does give an inferior appearance.

Carbohydrogen gas, which is a mixture of hydrogen and methane gases, is ideally suited for welding magnesium alloys, particularly in the thinner gages. It has a lower flame temperature than acetylene and is very easily regulated. If the carbohydrogen gas is used in welding heavy sheet, small amounts of acetylene are sometimes mixed with it to increase the flame temperature. Mixtures of hydrogen and acetylene are also used satisfactorily and offer a means of welding light sheet when carbohydrogen is not available. Unmixed hydrogen is not used, generally, because of the difficulty of adjusting the flame. In using all of the above gases the torch should be adjusted so the flame is neutral or slightly reducing.

A flux generally is used to prevent oxidation while welding. Dow Nos. 460 and 450 (Table XI) are recommended. No. 460 flux is recommended for welding with all kinds of gases, while No. 450 is suitable only for oxyacetylene. The fluxes in powder form are mixed in the proportion of one part water to two parts powder by volume to obtain a paste that is suitable for brushing on the weld area.

Various diameter extruded welding rod is available in all alloys. The rod should be of the same alloy as the material being welded but in case it is not available, an alloy with slightly lower melting point may be used. If it is necessary to weld different alloy materials together, the rod having the composition of the lower melting point material should be used. The recommended ranges of sheet gages on which a given rod size may be used are listed in Table XVIII.

Preparation of Surface for Welding: All grease, dirt, oil and other foreign matter should be cleaned from parts by means of solvents or alkaline cleaners. Unpickled sheet may be welded without further cleaning but sheet which has been chrome-pickled should be cleaned free of the coating by means of steel wool or a wire brush. Pickled sheet is sometimes welded without cleaning but the chromates cause porosity in the weld metal and impair free flowing characteristics obtained with bare surfaces.

A special "in process" pickle may be used to protect parts in storage, leaving the metal in condition to be welded. This treatment consists of a one-minute dip in a bath of 15 to 20 per cent chromic acid and 3 per cent calcium, sodium, potassium, or magnesium nitrate. However, as will be noted in a subsequent section on finishing, this pickle treatment is not used as a final finish treatment due to the poor paint adhesion that it affords.

Procedure: Sheet up to ⅛-in. in thickness can be welded with square edges. Sheet over ⅛-in. should be beveled on one side to form an included angle of approximately 90 degrees. The vee should not extend through the sheet but should have about a 1/16-in. flat or land remaining to provide better fitup conditions and to prevent the sharp edge from melting away as soon as heat is applied.

Jigs should be provided to hold the sheet in good alignment for tack welding. The usual practice is to remove an assembly from a jig after tack welding, and finish welding without a jig. Sheets of the same gage up to a thickness of 0.064-in. are normally butted flush for welding.

TABLE XVIII

ROD SIZE VERSUS SHEET THICKNESS

Rod Diameter Inches	Sheet Gage Inches
3/32	up to 0.064
⅛	0.051 to 0.128
5/32	0.091 to 0.25

TABLE XIX

EFFICIENCY OF GAS AND ARC WELDS

Alloy	Gas Weld* Efficiency	Arc Weld* Efficiency
	Per Cent	
J-1	90	95
M	65	70
FS-1	90	90

* Efficiency with bead as welded. If bead ground flush the efficiencies will be 5 to 10 per cent lower.

Sheets from 0.064 to ⅛-in. thick are set up with a gap approximately equal to the metal thickness being welded. Beveled sheet from ⅛ to ¼-in. thick should be set up with a gap of 1/16-in. When sheet thinner than 0.064-in. is butted to sheet thicker than 0.064-in., no gap is provided.

Cast fittings or fittings machined from extruded stock are provided preferably with a flange about the same thickness as the sheet into which they are to be welded to eliminate trouble of sheet melting away before a heavy fitting section can be heated to the temperature required for fusion. Parts of a weld jig for locating fittings should be made adjustable in a direction perpendicular to the surface of the sheet in which a fitting is to be welded. This is necessary because the sheet edge may move in or out when it is heated, depending on the shape of the part. Fitting must be so held that while the welding is being accomplished good line-up of the fitting flange and sheet may be obtained. For example, in welding a fitting in the end of a 14-in. hemispherical tank head it is necessary to set the casting about 3/32-in. above the sheet surface when the head is cold to allow for expansion during welding. After proper location to obtain alignment is determined experimentally the casting locator is locked in place.

Parts to be welded are fluxed on both sides of the sheet where tack welds are to be placed, the distance between tacks being from 1.5 to 6 in. apart, depending on the shape of the parts being welded and the gage sheet used. If the welding rod surface is dirty or badly oxidized it should be cleaned with steel wool. The rod is fluxed and tacks are made, after which the weld area on both sides is fluxed and the joint completed.

In starting the weld, torch flame is moved over the point at which the head is to be started until the flux has been thoroughly dried. The manipulation of rod and torch is very similar to that used in welding aluminum. If an incompletely fluxed area starts to burn while the bead is being run the torch should be removed and the burning will stop immediately. The burned area should be scraped clean and refluxed before the weld is continued. On completion of the bead the torch should be played on the work for a few seconds to allow the stopping point to cool slowly. If this is not done, the rapidly cooling weld metal may contract locally and result in a small pit or crater.

Finishing: After the weld is made, it is desirable that all traces of flux be removed from accessible areas as soon as possible by scrubbing the weld area with hot water and a steel wire brush. Following the scrubbing, parts are given a chrome-pickle treatment (see subsequent section devoted to finishes) or the "in process" pickle treatment previously described. The chrome-pickle treatment is generally used providing further welding is not required. If the part is a subassembly and further welding is required, the "in process" pickle is used as this need not be removed for welding.

After the assembly is completely welded and pickled it should be given a 1 to 2-hour boil in a 5 per cent solution of sodium dichromate to effect complete removal of any surface flux and to provide additional surface protection. The boil serves to remove flux which cannot be removed in the scrubbing operation as, for example, when a head is attached in finishing a tank assembly. It is used only after an assembly has been completed and is not necessary on subassemblies to be stored except for removal of flux from inside seams which cannot be scrubbed.

Arc Welding: Magnesium sand and permanent mold castings, extrusions, forgings and sheet can be arc welded. The process resembles carbon arc welding of steel, with a tungsten electrode replacing the conventional carbon electrode. In addition, an inert gas such as helium is employed to shield the molten metal area during welding. Gas is confined to the welding area by means of a

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TABLE XX
ARC WELD DATA

Thickness Inches	Current Amps.[1] Alloys J-1, FS-1 and O-1	Alloy M	Filler Rod Diameter Inches	Helium Flow Cu. Ft./Min.	Tungsten Electrode[2] Diameter in Inches J-1, FS-1 and O-1	M
0.030	15- 25	20- 30	3/32	0.3 to 0.6	3/32	3/32
0.040	20- 30	25- 35	3/32	0.3 to 0.6	3/32	3/32
0.050	20- 35	30- 45	3/32	0.3 to 0.6	3/32	3/32 or 1/8
0.060	30- 45	40- 55	3/32 or 1/8	0.3 to 0.6	3/32 or 1/8	1/8
0.070	45- 60	50- 65	1/8	0.3 to 0.7	1/8	1/8
0.080	55- 70	65- 80	1/8	0.3 to 0.7	1/8 or 5/32	5/32
0.090	60- 75	70- 85	1/8	0.3 to 0.7	1/8 or 5/32	5/32
0.100	70- 90	80-100	1/8	0.4 to 0.8	5/32	5/32
0.125[3]	75-100	85-110	1/8 or 5/32	0.4 to 0.8	5/32	5/32
0.150	80-110	90-120	5/32	0.4 to 0.8	5/32	5/32 or 1/4
0.200[4]	70- 90	80-100	5/32	0.4 to 0.8	5/32	5/32
0.250	80-100	90-110	5/32 or 3/16	0.4 to 0.8	3/16	3/16
0.500[5]	90-120	100-130	5/32 or 3/16	0.5 to 1.0	3/16 or 1/4	5/32 or 1/4
0.750[6]	110-140	120-150	3/16 or 1/4	0.5 to 1.0	1/4	1/4
1.000	120-150	130-160	3/16 or 1/4	0.5 to 1.0	1/4 or 5/16	1/4 or 5/16

[1]Currents given are for welding speeds of approximately 12 inches per minute in single pass welds. In multiple pass welds the welding speed per pass is higher.

[2]The inside diameter of the inert gas cup should correspond to the tungsten diameter as follows: 1/8- and 5/32-inch electrode—7/16-inch cup. 5/32-inch electrode—1/2-inch cup. 1/4-inch electrode—5/8-inch cup. 5/8-inch electrode—3/4-inch cup.

[3]Sheet 0.1 to 7/64 inch thick beveled from one side of sheet.

[4]Sheet over 7/64 inch thick beveled from both sides of sheet.

[5]Multiple pass welds in sheet over 1/4 inch thick.

[6]In welding material 3/4 inch thick or heavier it is desirable to preheat the material to 500 to 600 degrees Fahr. (260 to 316 degrees Cent.) to increase the welding rate.

shielding cup around the tungsten electrode. No flux is required during arc welding and, as a result, the process has the advantage over gas welding that all types of joints commonly used on steel can be used on magnesium.

The use of arc welding in preference to gas welding is often determined by the type of joint required. While gas welding must be limited to butt type joints to insure removal of the corrosive flux, arc welding which uses an inert gas shield to prevent oxidation of the material can be used on lap joints and fillet joints, and on all other joints such as those commonly used in steel arc welding. Since multipass welds are permissible, there is no top limit on the material thickness which may be welded, as there is in gas welding. Generally, arc welding is preferred to gas welding in material over 0.1-in. thick because of the faster welding rate obtainable. Arc welding is preferred for parts where warpage must be held to a minimum. Warpage is reduced by the higher heat available with the arc, enabling fusion temperatures to be reached with less diffusion of heat to adjacent metal.

Applications: Arc welding is employed where maximum strength joints are required in alloy M and J-1 structures. The strength of FS-1 sheet is approximately the same as when arc welding is used. A comparison of the efficiencies which may be obtained with butt welds made by both methods is given in Table XIX prepared by Dow Chemical Co. All wrought materials except FS-1 sheet have good arc weldability. FS-1 sheet has a limited application for arc-welded structures, but as in gas welding, restrained welds must be avoided or cracking may result.

Equipment: In arc welding magnesium alloys the arc is struck between a tungsten electrode and the work in much the same manner as in the carbon arc welding of steel. While welding is in progress the arc is enveloped in an inert gas shield which excludes oxygen from the weld area and therefore prevents oxidation of the heated metal. This inert gas is applied by flowing it into the weld area from a cup surrounding the electrode. Function of a torch for arc welding magnesium alloys is to hold electrode and cup and to carry the welding current and shielding gas. A valve is provided in the torch handle to control flow of inert gas to the work.

Direct current and rectified alternating current arc welding machines of 100 to 200 amp capacity are normally used for inert gas welding of magnesium alloys. The machine should be of the stable arc type and should be equipped with a continuous ampere regulator to provide adequate current control. Reversed polarity (electrode positive and work negative) is required as straight polarity results in a wild arc unsuitable for welding. Use of a straight alternating current machine also results in a wild arc.

Tungsten electrodes ranging in size from 3/32 to 1/2-in. in diameter are used. Electrode should extend from 1/4 to 3/8-in. beyond the end of the gas cup for normal welding. It may be extended beyond 3/8-in. to reach tight corners. The filler rod should preferably be of the same alloy as the material being welded. Sizes of filler rod ranging from 3/32 to 1/4-in. in diameter are adequate for making welds in any size material.

Both helium and argon gas are used. However, it has been determined that about three times more helium by volume than argon is required for a given amoun of welding. Helium does not require a close an arc length as argon, therefore it is somewhat easier for a welder t use. The automatic voltage regulato on an automatic welder does not functio when argon is used. It must be discon nected and the weld made with a se arc length. When helium is used, th regulation is satisfactory and fully auto matic welding may be accomplished. Ac curate control of inert gas flow is ob tained by means of an oxygen therap regulator, or a flowmeter used in con junction with a standard oxygen or hy drogen regulator. In general, a tan containing 220 cu ft of helium will supply gas for approximately 10 to 15 hours o continuous welding with a medium size torch.

Preparation of Surface for Arc Welding: The first and most important step in arc welding magnesium is proper preparation of the metal surface. Almost all porosity and much of the incomplete penetration in arc welds is caused by improper or insufficient cleaning of the surface. It is important that all grease oil, chemically treated surfaces, oxide films and other impurities be removed from the weld area. This may be accomplished by the use of solvents and steel wool or by scraping. When a weld is made from one side of a sheet, the oxide coating on plain sheet or the pickled surface on a chemically treated sheet should not be removed from the bottom side of the sheet as these surfaces are beneficial in controlling the downdrop of the weld.

Sheet up to 0.1-in. thick is welded with a square butt joint. Material from 0.1 to 3/16-in. thick is beveled from the welding side to about a 90 degree vee which extends sufficiently far into the sheet so a 1/16-in. land or flat remains. Sheet over 3/16-in. thick should be welded from both sides wherever the nature of the structure permits, because sounder welds may be obtained and less warpage results. For a double vee joint the 90 degree included angle should extend from both sides so as to leave a 1/16-in. land in the center of the sheet. When welding a double vee joint the back of the first bead should be chipped out using a chipping hammer fitted with a cape chisel to remove oxide film, dirt, and incompletely fused areas before the second bead is added. Chipping back of weld is also used in some cases where welds are made from one side in heavy material.

In making tee welds the leg of the tee is not veed if it is under 0.080-in thick. Thicker material should be single or double beveled to an open angle of 60 degrees, leaving about a 1/32-in land at the base. Single bevels are used

on material up to 3/16-in. thick to be continuously welded; double bevels are used where material over 3/16-in. thick is to be continuously welded. Where stagger tack weld tee joints are used and the leg of the tee is over 0.08-in. it is beveled to a 60 degree angle halfway through the sheet at the points the tacks are to be placed.

Jigs for arc welding are usually more complete than those used in gas welding. The entire welding operation is normally completed in the weld jig instead of being removed from the jig after tack welding as is the case in gas welding. Fitup for welding must be quite accurate as gaps in the sheet make it difficult to shield the weld properly. The function of an arc welding jig is to hold the parts being welded in proper alignment, to keep the weld gap as small as possible, to hold the parts in the proper relative location to each other, and to keep warpage to a minimum. When parts are properly jigged the bead is run directly without tacking the sheet prior to the operation. Tacks must be used when jigs are not furnished to hold the sheet in the correct position for welding.

Correct machine settings, inert gas flow, and other settings required in starting a weld are shown in Table XX. The inert gas valve is opened before the arc is struck. After metal under the arc becomes molten the filler rod is fed to the arc. Actual manipulation of the torch and rod is quite similar to that used in gas welding. The torch should be held as nearly perpendicular to the sheet as possible in order to obtain the maximum shielding effect with a minimum amount of gas. The filler rod should be held at an angle of at least 60 degrees from the torch to prevent reflected heat from the electrode from causing the rod to melt prematurely which in turn would cause an uneven bead and poor penetration.

Stress Relief of Welded Joints: Residual stresses set up during arc welding of magnesium are relieved by placing the parts in a jig or clamping plate and heating the structure in accordance with the temperature and time shown in Table XXI. After heating, parts are cooled in air free from excessive drafts. The use of jigs when carrying out this operation is preferred so that relief of the stresses will not result in warpage.

The fact that no flux is used when arc welding magnesium makes cleaning after welding a simple operation. The welds need only to be wire-brushed. Parts are then ready for the usual chemical treatments applied prior to painting, which will be described in detail in the subsequent section devoted to finishing. Routing, grinding, filing and similar operations may be used when it is desired to remove excess bead. Arc weld should

TABLE XXI

RECOMMENDED STRESS RELIEVING TREATMENTS FOR ARC-WELDED MAGNESIUM JOINTS

Dowmetal Alloy	Temperature °F ±10°	Time at Temperature
FS-1a	500	15 minutes
FS-1h	265	1 hour
Ma	500	15 minutes
Mh	400	1 hour
J-1a	500	15 minutes
J-1h	400	1 hour

be inspected for undercutting, cracks, porosity, overlapping, craters, inclusions and similar defects by standard methods such as visual inspection, radiography and the fluorescent oil penetrant method.

Resistance Flash Welding: This method of joining the ends of bars, tubing, etc. has not been used extensively in joining magnesium alloys although sufficient recent experience was obtained to prove the process feasible. Joint efficiencies ranging from 85 to 95 per cent are reported in Dow alloys FS-1, J-1 and O-1. Experience to date indicates that it is difficult to obtain good welds in Dow alloy M; this is probably due to its very narrow freezing range.

Butt welding, in which the current is applied after the pieces to be joined are butted together, is not so successful as flash welding. Higher current is required, the procedure is slower and the parts to be welded must be more carefully fitted. It also results in hot shortness and the formation of an oxide film between the parts. Because of the high heat conductivity of magnesium alloys a very rapid pushup is required.*

Best results are obtained with automatic motor-operated machines which permit rapid pushup and give a constant acceleration for maintaining the arc during the flashing period. As magnesium alloys have relatively low electrical resistance, high current is required. For example, in welding 0.5-in. round bars, from 13,500 to 17,000 amp are needed. Using this procedure it is not necessary to clean oxide from the surface to be welded or from the surfaces in contact with the clamping die. However, any dirt which might cause burning on a surface held in a clamping die should be removed.

Soldering: Magnesium alloys can be soldered with the use of special soldering compositions. Soldering generally is used only for filling small surface defects in castings, and in some instances for small dents in sheet on which a smooth paint job is desired. Soldering is not recommended if the soldered area is required to withstand stresses; it ordinarily is not considered for joining magnesium parts or for joining magnesium to other metals.

Two solders for magnesium alloys designated solders A and B were developed by Dow Chemical Co. Solder A starts to melt at 315° F and is suitable for general soldering. Composition is 60 per cent cadmium, 30 per cent zinc and 10 per cent tin. Solder B has a higher melting point, 500° F, and is slightly more difficult to apply than Solder A. Area to be soldered should be preheated to about 500° F, and more vigorous rubbing with the soldering tool is necessary to obtain good alloying action. This solder should be used if the magnesium part is to be heated above 275° F after soldering, as, for example, during the baking of subsequent paint coatings. Solder B consists of 90 per cent cadmium and 10 per cent zinc.

Magnesium alloy surfaces should be cleaned to a bright metallic luster before soldering. This is necessary if good alloying action between magnesium and solder is to be obtained. Filing, wire brushing and sanding with aluminum oxide abrasive cloth are satisfactory cleaning methods. In the soldering procedure it is desirable to preheat magnesium part with a torch, to 300 to 400° F around the area to be tinned with solder. A small quantity of solder is applied, and by means of a sharply pointed iron tool it is rubbed vigorously at the interface between the molten solder and the magnesium. Solder should be maintained molten and the rubbing action continued until the solder has alloyed. Flux is not necessary and its use is not recommended.

(*Continued in later issue*)

Earthmover Found To Be Efficient Coal Handler

Coal not needed immediately for the boilers of Indianapolis Power & Light Co. is bottom dumped from railroad cars into a pit, then picked up and deposited in an open area by an overhead clam. From there it is loaded by an R. G. LeTourneau earthmover, and hauled to a 4-acre stockpile nearby and spread in 4 to 6 in. lifts.

This handling method of handling coal was found so efficient that it helped eliminate danger of coal overheating. Working on a 600 to 700 ft haul from the open area to the stockpile, it is reported that the Tournapull averages moving of 142 tons per hour.

During an emergency or coal stoppage, coal may be loaded by Tournapull from the stockpile, hauled and dumped directly into the plant grizzly which feeds coal by conveyor belt to the stokers. Loaded rigs pass directly over an enclosed timper track, and grizzly ordinarily used to dump railroad cars. Rigs also have been used to deliver coal to another of the company's stations in another part of the city.

MEASURING *Force and Horsepower* . . . in automobile engines

FORCE and horsepower in automobile engines are being measured by new methods at Buick's Flint, Mich., plant. These involve the use of an instrument called Thrustorq developed by Hagan Corp., Pittsburgh. Attached to a dynamometer, the Thrustorq measures force as the product of an accurately-gaged air pressure action on a precision diaphragm.

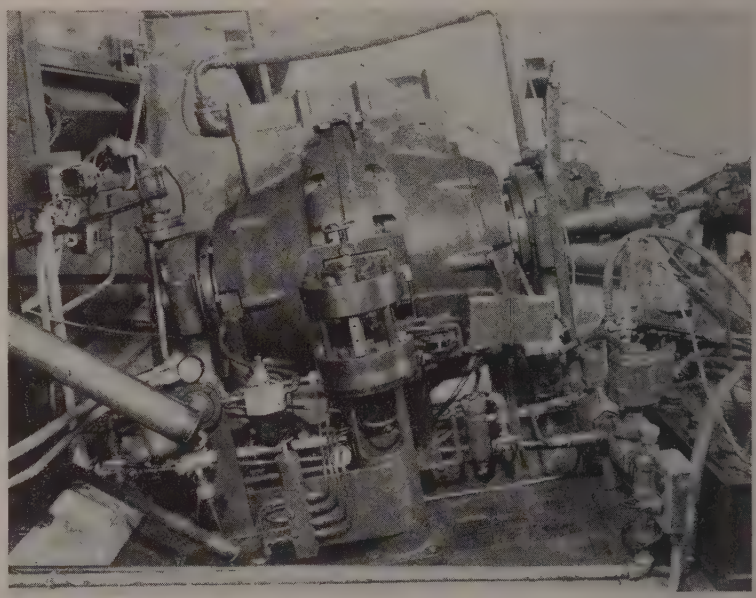
In developing the new testing procedure it was decided to test engines at approximately the same angle at which they will operate in the finished automobile. As a result, the present dynamometer installation is tilted 10 degrees from the horizontal. This permits operation of engines at angles up to 20 degrees without a serious angular deflection in the universal joint which transmits engine power to the dynamometer. If desired, the dynamometer could be mounted at any angle from horizontal to vertical.

Buick is using the Thrustorq for both endurance and power runs. Standard practice calls for running the engine for 100 hours and then taking it off the stand. It is then completely disassembled and checked for wear. After the checkup it is again placed back on the stand and run to failure at continuous speeds well above those expected to be developed even in abnormally high-speed operation of the finished automobile.

Two other major tests are now being planned, each to be equipped with the Hagan instrument. One will be in connection with a Gleason axle-testing machine. In this test two axles will be hooked together, force being applied in opposite directions. This test will be carried to failure of the axle. A 60 sq in. Thrustorq capable of measuring torque from 200 to 185,000 lb-in. will be used.

In the second test a new chassis dynamometer testing machine will be used. The car is anchored so that it cannot move; wheels, however, turn at road speed, the resulting torque being absorbed by the dynamometer.

Inclined engine dynamometer for testing automotive engines which will be mounted in chassis on an inclined plane. Compressed air-operated double Thrustorq used in test stand is located in the center here



High Speed Steels

(*Continued from Page* 95)

Time in minutes and hours is shown on the horizontal axis and per cent of retained austenite on the vertical axis.

It may be readily observed that type A which is the 18-4-1 type is considerably more resistant to transformation than either the molybdenum, tungsten or the molybdenum, tungsten and cobalt types. These results prove that type A requires about 2 hours for transformation to reach completion while only about 20 min were required for types B and C, even though the percentage of transformation was far greater in case of type C.

This does not mean that the data from Fig. 14 should be applied immediately by heat treaters as a time period to be followed for tempering high alloy steels. The main reason that such data cannot be used too literally is the fact that consideration should be given to the following two reasons for tempering high speed steels: (1) To transform a large portion of the retained austenite, and (2) to relieve the unbalanced residual stresses which have been induced mostly by the volumetric changes involved during the structural transformation.

Since residual stresses are very difficult to measure it becomes very much a matter of guessing as to how much time is required at tempering temperature to relieve such stresses. It has, for a long time, been common practice to use two or more successive tempering operations —the first being primarily to effect a structural change and the second for a stress relief.

Data given by Fig. 14 should, however, be of considerable practical value to heat treaters for a general guide as to how a certain high alloy might be expected to perform during the tempering operation. It obviously answers one question which is relative to the problem of cracking and why some high speed steels are more susceptible to cracking than others. It has been the experience of the author, and no doubt of others as well, that cracking in tools or other parts made from high speed steel usually tend to occur during the tempering operation rather than after cooling from the austenitizing temperature.

A study of Fig. 14 as well as some of the other illustrations suggests that if cracking tended to take place, the logical time would be during tempering in the cycle of operations. Since high speed steels as they exist in the as-quenched condition are usually composed of somewhere between 25-40 per cent austenite, it is not probable that cracking would occur because austenite is of more plastic nature and tends to cushion the effects of the transformation which has taken place

in cooling from the austenitizing temperature.

The author has found that the utmost care must be used in tempering parts made of a steel similar to type C as compared with type A. There is no doubt that the rate of transformation during tempering is largely responsible for such a tendency to cracking. It is natural to expect that as more austenite is transformed that there is less present to act as a cushion to absorb the stresses set up by the volumetric expansion during the formation of martensite. Therefore, referring to Fig. 14 it is obvious that in 18-4-1 steel, type A, about 20 per cent of austenite is transformed over a period of approximately 2 hours; in the high cobalt, type C, about 33 per cent of austenite is transformed in about 20 min.

In order to have a better knowledge of the physical changes which take place during tempering and to be able to prevent cracking from the causes which are described in the immediately preceding paragraphs, it is also necessary to have a full knowledge of just when during tempering all this transformation actually takes place, i. e., whether it is during the heating or the cooling part of the cycle. So far it has been reported in previous investigations that there was little or no transformation in the heating part of the tempering cycle.

Reports from other investigations have shown also that a small amount of transformation took place during prolonged holding periods at the tempering temperature, but that in all cases most of the austenite transformed during cooling from the tempering temperature, the larger part being affected between 500° F and 400° F in the cooling cycle. The author has believed for a long time that these previously reported results were somewhat in error due to results in actual practice not being consistent with some of the theories which had been advanced.

Results of a rather elaborate project along this line are shown in Figs. 9, 10 and 11 which separately show such results for types A, B, and C respectively. These charts also show the tempering plotted along the horizontal axis and the per cent of austenite along the vertical axis. The difference being that these charts show the percentage of existing austenite when measured at the temperatures indicated. The curved lines on these figures marked "at temperature" indicate the amount of austenite present for specimens after austenitizing at the optimum temperature, cooling to room temperature and tempering for 1-hour at the various temperatures indicated.

Specimens were removed from the tempering furnace and the transformation measured within approximately 2 sec, quenched in water, and again measured. When any difference was found in the

DANLY PRESSES

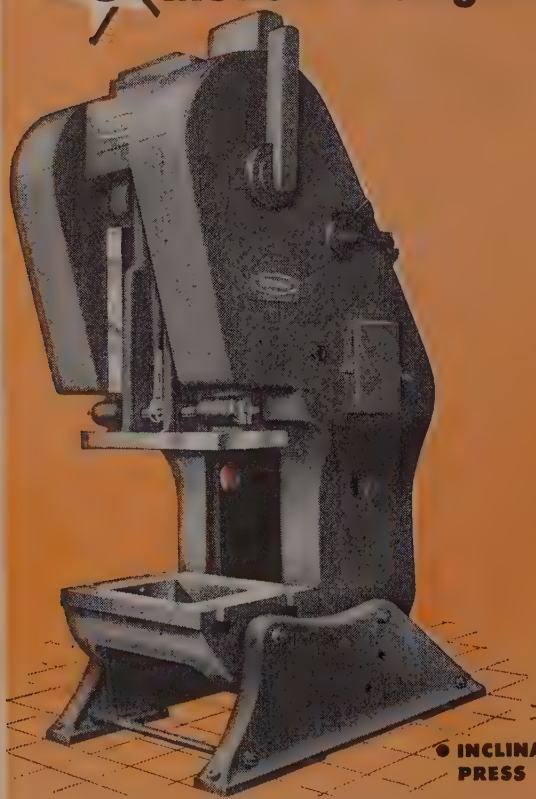
1 Rugged Construction

2 Mechanical Accuracy

3 Pressure Lubrication

4 Air-Friction Clutch

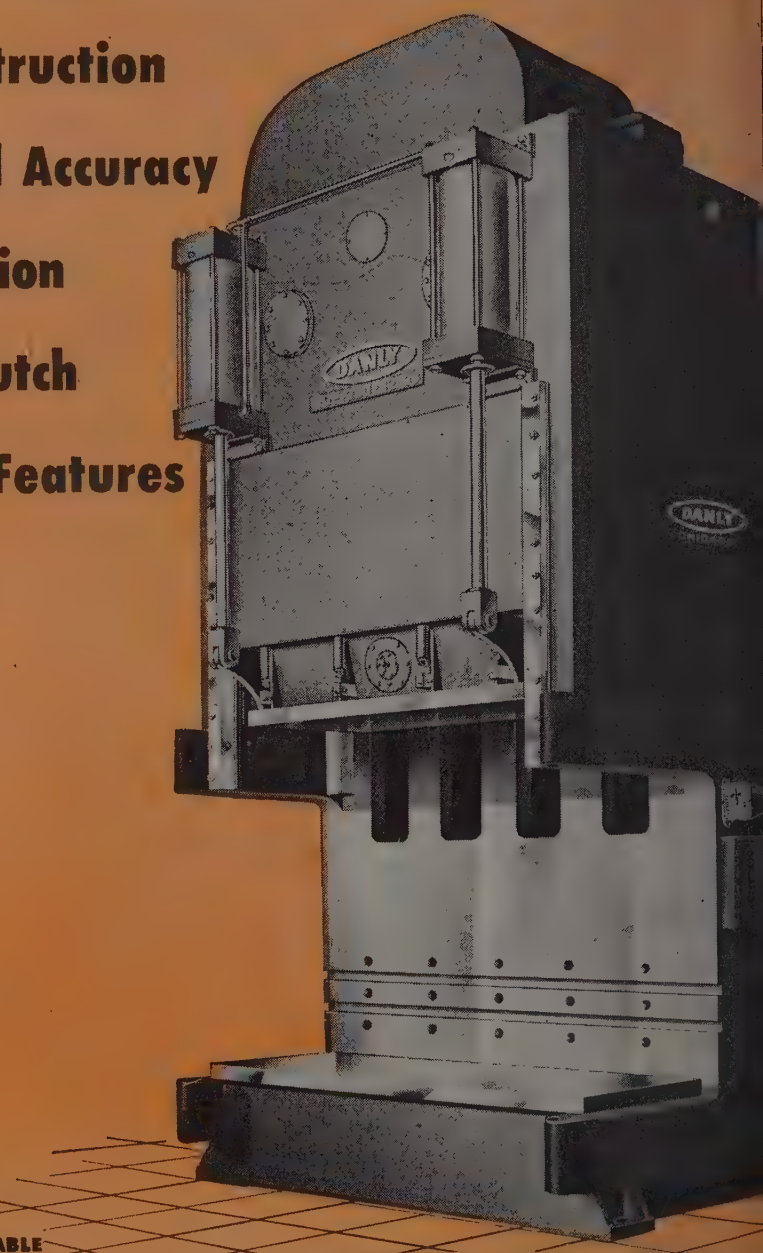
5 Modern Design Features



● INCLINABLE PRESS

This 100-ton, eccentric gear, Inclinable Press, has a unit frame of rugged one-piece all-steel construction. Extra long gibs and two suspension points—insure even pressure along the full length of the stroke, make for accurate alignment on large or progressive dies.

This press has an 8" stroke—operates 40 strokes per minute. Adjustment of slide—4" by hand. Bed area is 31" x 40"—designed to be equipped with air cushion if desired. Pivot point is so arranged that the center of the bed is not elevated when press is inclined. Distance floor to bed—33". Shut Height—19".



● GAP-FRAME PRESS

The 250-ton, 2-Point Eccentric Gear Gap-Frame Press, *shown above* is of all steel Danlyweld construction. Intermediate *continuous* structural members extend up through the back of the frame reducing deflection throughout the entire length of the bed. Gearing and driving members are completely enclosed within the frame.

This press has a 14" stroke—operates at 20 strokes per minute. Bed area is 32" x 84". Shut height—54".

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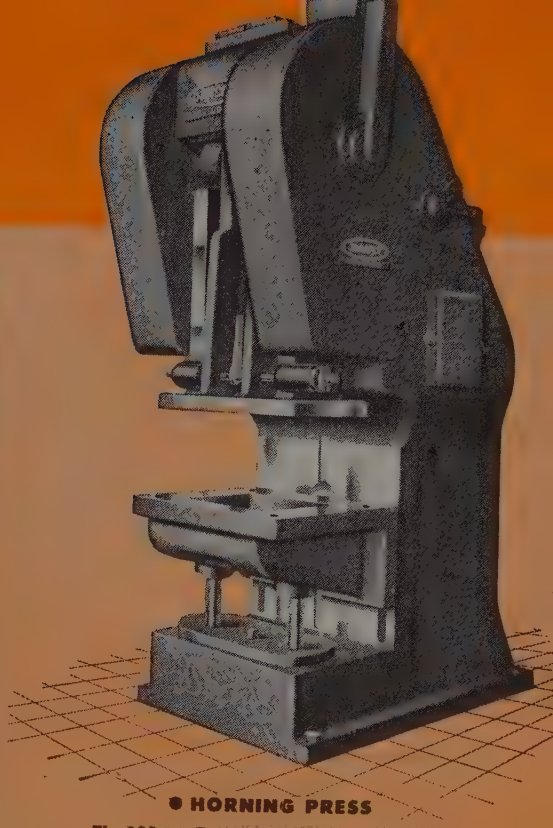
● 4-POINT STRAIGHT-SIDE PRESS

Compact, enclosed construction keynotes the design of the 300-ton Straight-Side Press, *shown above*. Gears and driving members are completely enclosed within the frame.

This press has eccentrics cut on the four main gears and 4 Suspension Points—Extra Long Gibs. Bed area is 58″ x 96″. Stroke is 18″—Double geared to operate at 18 strokes per minute. Adjustments of Slide—12″. Shut height—54″. Air-Friction Clutch, Electric Stroke Indicator, and Push-Button Control—Motor Adjustment of Slide, are standard equipment on this model.



● HORNING PRESS

The 100-ton Eccentric Gear, Horning Press, *shown above*, has a one-piece all-steel frame. Extra-long gibs and 2 suspension points—unusual features in a press of this type and size, make for accurate alignment on large or progressive dies.

This press has an 8″ stroke—operates at 40 strokes per minute. Adjustment of slide—4″, by hand. Shut height with knee adjustment down, slide adjustment up—20″; adjustment of knee—10″. Shut height with knee removed—39″.

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●

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amount of transformation in the specimens between the measurements at tempering temperature and after quenching to room temperature, the process was repeated on other specimens which were then measured at tempering temperature and subsequently quenched in other media held at various know temperatures in order to learn at what temperature the transformation took place in cooling from the tempering temperature.

Solid lines marked "at temperature" on Figs. 9, 10, and 11 indicate the amount of transformation which has taken place during the heating cycle and at temperature while the horizontal dotted lines drawn from the curve back to the vertical line marked room temperature indicates the percentage of transformation after cooling rapidly to room temperature. For example, in type A steel (see Fig. 9) the transformation starts at about 500° F and continues rather rapidly as temperature is increased. Up to a tempering temperature of 1000° F there is no transformation in the cooling cycle. After the temperature of 1000° F is passed, a further transformation is effected in the cycle (note the dotted line drawn horizontally from 1050° F). In the heating cycle up to 1050° F, the percentage of austenite decreased from about 32 per cent to approximately 16 per cent then further decreased to about 12 per cent as the specimens cooled from 500° F to 400° F. No transformation was noted as the specimens were cooled from 400° F to room temperature. Figs. 10 and 11 are now self-explanatory for they show results of data compiled in the same manner. Both B and C types start to transform at a somewhat lower temperature. It may be noted that type C shows a transformation during cooling from 1000° F instead of 1050° F, but below 1000° F measurements of existing austenite were found to be exactly the same at the tempering temperature and after quenching to room temperature.

Since these data seem to prove thoroughly that the major portion of the transformation takes place during the heating to the tempering temperature, it seems logical to view this part of the heat treating cycle in a somewhat different light. In the past, many have cooled parts made from high speed steel by slowly furnace cooling them from the tempering temperature. While this practice would probably be helpful in the prevention of cracks due partially to the small amount of transformation taking place in the cooling and partially to lessening the shock of thermal contraction, it seems much more logical that the heating should be the part of the operation to guard most carefully.

The data which has been compiled and discussed in this article points out quite clearly the dangers involved in loading parts made of high speed steel into a hot furnace or even heating at a rapid rate. For any parts made of high speed steels and particularly those made of such a steel as type C it is recommended that they be loaded at room temperature or at least under 300° F brought up to temperature with furnace.

In case of tools having radical variations in section thickness it is a good practice to raise the temperature in steps; for example, first setting the temperature controller at about 500° F then after the charge has assumed the temperature of the furnace increasing the temperature to 750° F, and finally to 1050° F—or to whatever maximum temperature is used. Although the rate of cooling from the tempering temperature seems to be far less critical than that of heating it is not recommended that they be cooled in any medium which removes heat faster than still air. After this carefully done tempering operation has been completed the part should be tempered a second time to relieve stresses and effect some further transformation. The practice of using a third temper, if time and furnace capacity permit, might be a good one although actual value has been questionable.

Glass Fibers

(*Continued from Page* 99)

used for the insulation of floors and the construction of self-supporting—but not load-bearing—partitions. A 6-lb density, asphalt-enclosed board is made for use only on ceilings, and on walls where the structure carries the whole load.

These boards, which can be molded into cylindrical form, provide a convenient and efficient material for insulating steam and other pipes in all standard sizes up to 30 in. inclusive for temperatures up to 600° F. A blanket-type insulation with a metal-mesh facing is employed for insulating pipes up to 1000° F in sizes from 3 in. up. A high-temperature block is available for insulating boilers, breechings, heated tanks, casings, ducts and other heated process equipment operating at temperatures up to 1800° F.

Fabrics: Incombustibility and dimensional stability are largely responsible for the numerous current uses of glass fiber textiles. Tensile strength of standard glass textile fibers is in the order of 250,000 psi. Average fiber diameters range from 22 to 38 one-hundred-thousandths in. Realizable strength, after the fibers have been fabricated into yarns and fabrics, is somewhat less than the strength of the individual fibers, and is influenced by the construction of the yarn and weave of the fabric. The breaking strength, however, is considerably higher than that of other textile materials of comparable thickness and construction.

The incombustibility and dimensional stability of the glass fibers are retained in the yarns and fabrics. Like the fibers, the yarns show an elongation up to 3 per cent at maximum tension. Fabrics have little or no stretch, except that due to the weave. Moisture changes do not cause stretch or shrinkage. Both yarns and fabrics have good electrical insulating characteristics. Like the fibers, the fabrics are unaffected by weak alkalis, and by acids, except hydrofluoric and phosphoric acids.

Fabrics of Fiberglas coated with synthetic rubbers and resins developed for war uses have high tear strength, withstand repeated flexing, are resistant to destruction by fungi, and have high dimensional stability. Other properties vary with the coating employed, but coated glass fabrics are being produced which are flameproof and have high resistance to moisture penetration and to the effects of contact with gasoline, oil, chemicals and greases.

Present uses include aircraft battery covers, oil pressure switch diaphragms, aircraft tape for expansion joints of hot air ducts, protective clothing for workers in chemical plants and protective carrying cases for precision instruments. Per-

formance of the material in this last application has created a potential demand for it in other similar applications where leather or organic fabric construction has been used. One such application is durable, light-weight luggage.

Glass fiber tapes, braids, cloths and sleevings, impregnated with a suitable varnish were being widely employed as electrical insulation in motors, generators, transformers and other electrical units before the war. The same characteristics that caused this kind of electrical insulation to be so widely used in war applications—a small space factor and resistance to high temperatures and moisture penetration— are proving a major aid to design engineers in their continuing efforts to give electrical equipment greater stamina and to reduce the size and weight of units required to do a given job. For special uses, glass fiber insulated motors have been made that weigh only a pound per horsepower.

Glass-Reinforced Plastics: In fabricating glass fiber-reinforced plastics, layers of Fiberglas cloth are impregnated with a low-pressure, thermo-setting resin and are placed, one on top of another, until a laminate of the desired thickness is built up over or in a mold; or the laminate may be built up and then draped over, or shaped in, a mold. The mold, and the laminate formed to the desired shape, are placed in an oven where the laminate is cured.

Because the low, or contact, pressure resins polymerize without giving off volatiles, it is possible to cure them in any desired shape merely by holding them in contact with the mold. This makes possible the fabrication of very large parts—the whole top of a railway car or the hull of a boat, for instance—without the expense and physical limitations imposed by the use of high-pressure presses.

It also means the elimination of expensive dies and jigs for since high stresses are not applied to the molds they can be of inexpensive construction. All this adds up to the fact low-pressure, glass-reinforced plastics can simplify and lower the cost of fabricating many parts, particularly large parts and those involving compound curves. They permit a frequency of design change that is uneconomic where there is a heavy investment in costly dies.

In general, their field appears to be the range and variety of parts that are produced in the hundreds or thousands rather than in the millions, and in the production of which, because of their relatively small volume, the cost of expensive metal dies is a prohibitive or burdensome factor.

Glass-plastic laminates can be given a highly polished finish in any desired color by spray-painting them with cellulose-acetate or cellulose-nitrate based finishes. Also, a polished, color finish can be applied by impregnating the glass mat with a resin to which the color has been added, and bonding the mat to the laminate in the mold.

In machining glass-plastic combinations, ordinary machine shop equipment is used, but at higher speeds than in the machining of metals. The mechanic who could make a part if it were metal can, with a little experience, do an equally workman-like job on glass-plastic laminates. For longer tool life, carbide or carbide tipped tools should be used.

These glass plastic combinations possess extremely high strength in proportion to their weight. Test specimens have shown tensile strengths of from 50,000 to 80,000 psi, compression strengths of over 50,000 psi, and impact strengths of over 30 ft lb, as compared with 2 ft lb for ordinary plastics. Comparative properties of glass-plastic laminates, steel, and aluminum are given in Figs. 4 and 9.

Aircraft parts have provided the most spectacular applications of glass-plastic combinations, but they are also widely used for the fabrication of tools, dies and jigs, and for panel boards on which electrical control instruments are mounted. Designers and engineers are experimenting with the material for such products as boats and canoes, passenger car and truck body parts, furniture, kitchen and bathroom assemblies, refrigerator and radio cabinets, and dozens of additional articles where attainment of light weight combined with high strength and ease of fabrication is the goal.

Air Filters and Tower Packing: One of the first commercial uses of glass fibers was for air filtration, in which pads of relatively coarse fibers, treated with an adhesive, were employed to strain dust and pollen from the air circulated by forced-warm-air heating systems, and air conditioning systems. Today glass fiber air filters are becoming a standard requirement for these systems in homes, factories, stores, theaters and other buildings. They are also widely employed in industrial plants to collect abrasive dusts created by manufacturing processes.

A recent development is the use of these coarse fibers as packing for distillation columns, acid coalescers, catalyst towers, and scrubbing or washer towers. The fibers are used for this purpose by the petroleum, chemical, distilling, steel and other industries. The great surface area and large free volume of the material increase operating efficiency and speed production.

Fibrous Glass Mats: The thin, felted Fiberglass mats which, by holding the power-producing material in place, gave longer life to storage batteries in military automotive equipment during the war, were used for the same purpose in passenger cars, buses and trucks before the war, and are again being widely used in storage batteries for peacetime automotive equipment. In addition, new uses for the mat have been developed.

In roll form, it is being employed as a material for wrapping undeground oil, gas and other pipe lines to protect them against corrosion and electrolytic action. It can be wrapped around bitumen or coal tar-coated pipe, thus forming a continuous water-tight bond. The material has negligible moisture pick-up and its tensile strength is preserved through a wide range of temperatures and exposure to organic solvents and soil acids.

These mats are being employed as the base for a new plastic laminated material. Possessing a low and stable loss factor over a wide frequency range, the laminate greatly extends the field for plastic coil forms, condenser spacers, stand-off insulators, etc., in radio, radar, television and other high-frequency electronic devices. In building up the laminate, glass fiber mats are impregnated with a thermo-setting aniline-formaldehyde resin, and are cured under high pressure. In addition to its low loss factor, the laminate possesses high strength, high temperature resistance, dimensional stability and resistance to fungus attack. Good machinability is another important property of the laminate.

Fibrous glass mat is also being employed as a base material for gaskets and sheet packing. The mat acts as a carrying medium for synthetic resins suitable for applications requiring resistance to heat, oil and acids. Glass base gaskets now being manufactured show high pressure resistance, good chemical durability and little flow under flange pressure.

—o—

LISTS ELECTRODE INCORRECTLY

In the January 6, 1947 advertisement of The Champion Rivet Co., Gray Devil No. 2 electrode was listed as a 6013 rod. This was an error as the rod is, in reality, 6012. The Graydac is the Champion 6013 rod.

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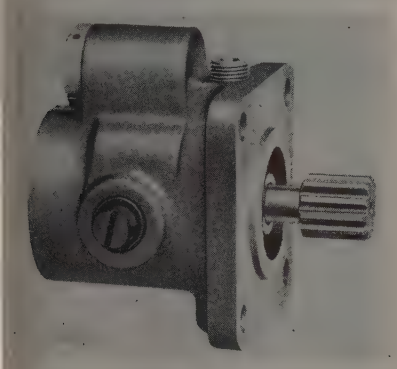
Publication of a new 168-page manual No. 15, by Bantam Bearings Division, Torrington Co., South Bend, Ind., completes a series of three volumes published to provide full bearing engineering data and to furnish an authoritative guide in the proper selection of suitable antifriction bearings for all types of installations.

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 134

1. Rotary Vane Pump

Romec Pump Co., 107 Abbe road, Elyria, O., announces a new small light weight model RD-7750 pump featuring a rotary vane-type mechanism, designed for handling. It is a self-priming positive displacement pump, particularly designed for handling liquids such as fuels and lubricating oils up to SAE 60. A self-priming, positive displacement pump, it also handles glycerine, glycols, or any



other noncorrosive fluids of a similar viscosity.

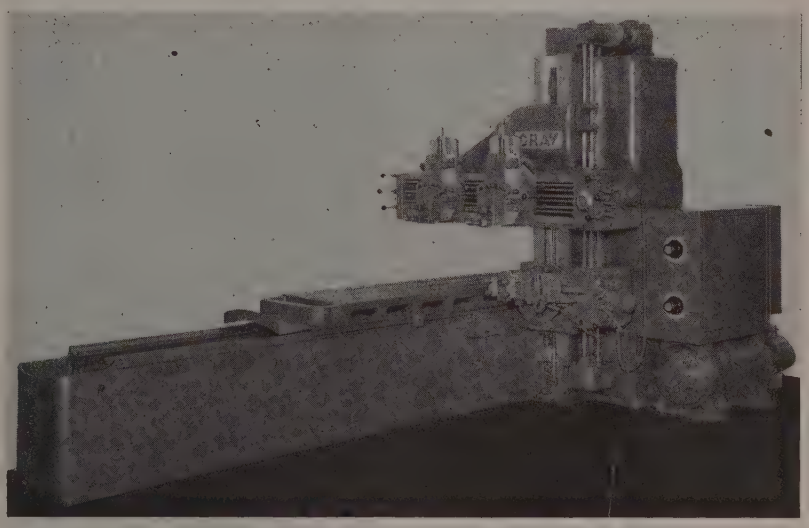
Materials used in the construction of the pump may be varied to permit handling of water, alcohol and various other light liquids. Its maximum pressure is approximately 60 psi for SAE 10 oil; 80 psi for SAE 40 oil. Maximum output is approximately 70 gph for the former and 60 gph for the latter. The pump also is offered with built-in by-pass and relief valves, or with various drive couplings and mounting flanges for engines and electric motors.

2. Openside Planer

Broad range of speeds up to a maximum of 300 fpm enables an operator to drive cemented carbide tools at their most efficient speeds on the new openside planer cub introduced by G. A. Gray Co., Cincinnati. With alternative combinations of main drive motor and planer gear ratio, it develops high table pull, permitting the planing of tough alloy steels at the low speeds required for maximum tool life.

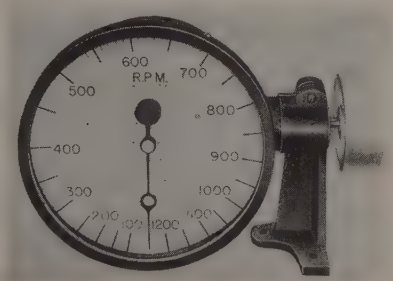
Great precision, highest speeds, and heaviest table loads are permissible, since scoring, curling, and distortion of the table due to heating, are practically eliminated by the inclusion of the nonmetallic table way as standard equipment. Loop lubrication also insures uniform lubrication at all table speeds irrespective of length of stroke, or position of table on bed.

Built in 24, 30 and 36 in. sizes, planer may be completely controlled from the operator's normal working position, controlling forward or reverse movement of the table, either by jogging or automatic cycle. By means of a push button, an operator may temporarily reduce the table cut speed to guard the edge of a cutting tool when it passes through an unusually hard or sandy spot in the work.



3. Stationary Tachometer

So free running that it may be driven with a thread, the new stationary tachometer manufactured by O. Zernickow Co., 15 Park Row, New York 7, is accurate to within one-half of 1 per cent in either direction of rotation. It may be

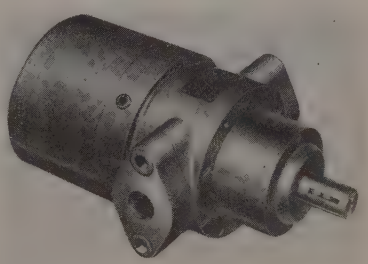


adapted to high or low speeds, such as inches or feet per minute.

Tachometer has a high ratio of 40 to 1. Ball bearing pendulum pivots, swivel link and driving spindle are included in its construction. An inertia damping mechanism also is built into the instrument. It may be driven by belt, gears, flexible shaft or direction connection by means of spring coupling. Various mountings and dial faces are available for the instrument which has a 6 in. dial.

4. Hydraulic Pump

Axial piston, constant displacement type 3500 series hydraulic pumps which are rated at 3500 psi for continuous duty operation are being manufactured by Denison Engineering Co., Columbus 16, O. Combining high pressure and volume



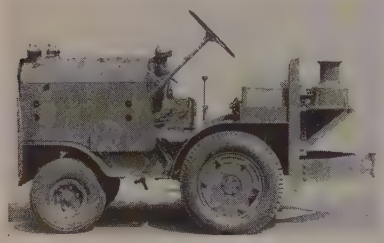
with power and speed of operation, pumps maintain volumetric efficiencies of not less than 95 per cent. Delivery volumes of 6, 17 and 32 gpm are possible at 1200 rpm.

Quiet at all operating pressures, the pumps eliminate the source of noise—vibration—which also causes wear on moving parts. Assembly consists of end cap, outer bearing race, cam plate, piston and barrel assembly, roller bearing, housing, shaft, port plate, port block and oil seal retainer. Pump and electric motor are connected by flexible couplings. Pres-

sures are adjustable by means of a relief valve. Mounting may be of foot, flange or face type.

5. Mobile Vertical Capstan

The A14V Shop Mule tractor, made by W. F. Hebard & Co., 336 West 37th street, Chicago 9, has a 2000 lb line pull vertical capstan winch and special



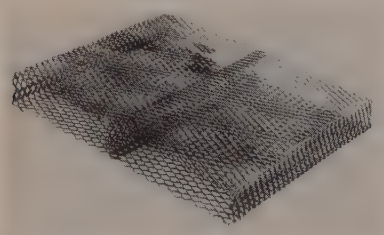
trailer hitch. It may be used to move heavy machinery or for railroad chores.

Weighing approximately 3000 lb, it is 42 in. wide, 80 in. long (less coupler or trailer hitch), and is 59 in. high overall.

Power is furnished by an International 4-cylinder U4 engine—30.5 brake horsepower at 1650 rpm with power take-off for vertical capstan. Maximum drawbar effort of tractor is 2400 lb. It may be mounted with cab, snow plow, or rotary sweeper broom.

6. Expanded Metal Pallet

An expanded metal loading pallet which combines light weight with tough serviceability is announced by Phillips Mine & Mill Supply Co., 172 Jane street, Pittsburgh. The expanded metal process

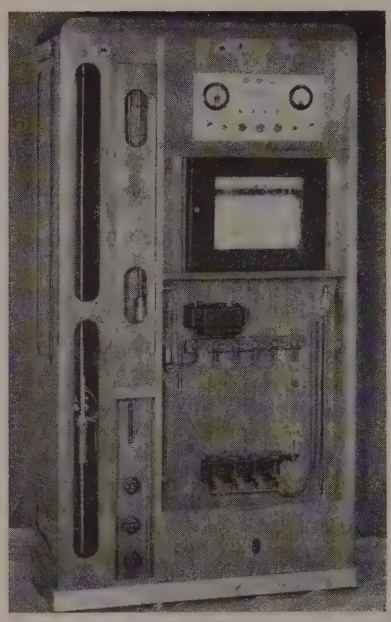


provides a lightweight pallet with sufficient deck friction to effectively hold loads. It is constructed of 13-gage material with ½-in. openings, and will accommodate approximately a 3000 lb load, regardless of size.

7. Gas Analyzer

A means of separating, identifying, measuring and collecting the components of light hydrocarbon gas mixtures, and recording the analytical data is provided by the Turner-Burrell adsorption fractionator made by Burrell Technical Supply Co., 1936-42 Fifth avenue, Pittsburgh 19. Fractions are identified by thermal conductivity and volumes are measured by a positive and accurate metering device. Analysis is graphically presented in curve form.

Operating technique is simple; unskilled personnel may be readily trained to follow standardized procedures. Equipment automatically follows a preselected program, permitting operator to be absent during major portion of the



analysis. Apparatus is a self-contained unit 78 in. high, 42 in. wide and 21 in. deep, weighing 500 lb. Maximum power requirement is 1400 watts. Connections other than electrical are not necessary.

8. Fume Collector

Ruemelin Mfg. Co., 3860 North Palmer street, Milwaukee, now offers a welding fume collector that draws smoke and heat away from its source by the use of high velocity exhaust hoods, with the fans exhausting outdoors. Using a small volume of air and consuming but a small amount of power for the fan, this system has a wide working range.

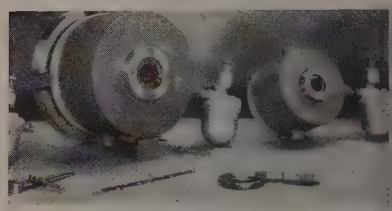
FOR MORE INFORMATION

on products and equipment described in this section, fill in a card following page 134.

Standard collector operates on a 9 ft radius and to within 2 ft 3 in. of the wall. It has a vertical range of 6 ft from the floor. For additional flexibility the hood is provided with a ball and socket joint so that many operations can be reached without moving the hose. A 3 in. vertical flange of a nonmetallic composition around the mouth of the hood prevents short circuiting by electrodes. A cast iron swiveling body is mounted to wall or post, supporting the flexible hose, hood and counter-balancing assembly.

9. Air Chuck

Greater feeds and speeds are possible, setup time is lowered and rejects are reduced with the air-operated chucks which grip along the entire length of the collet made by Erickson Tool Division

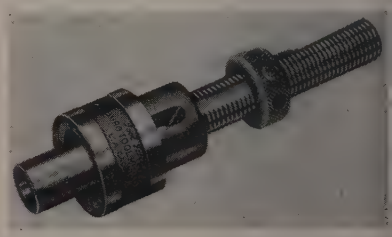


of Erickson Steel Co., 2309 Hamilton avenue, Cleveland 14. Model No. 501-AT has a range of ¼ to 1⅝-in. in various steps while No. 601-AT has a range of 11/16 to 2⅛-in.

Chucks have a collapsibility range of 1/32-in. Suitable for holding glass, ceramic tubing, ferrous and nonferrous metals for second operations, its use results in reductions in tool and parts breakage on drilling, buffing, polishing, honing and other operations.

10. Tool Holder

Holes with 15/16-in. center to center can be tapped with a new Neoprene-mounted, Tool-Flex tool holder built by Burg Tool Mfg. Co., 5028 West Jefferson Blvd., Los Angeles 16. It has threaded shanks for use on multiple-spindle tapping operations. Only four parts make up



the holder: Shank, collet, oil-resistant mounting and locking ring.

Neoprene mounting minimizes tap breakage and compensates for misalignment. Bell-mouthing, and over-sized holes are eliminated by the full-floating mounting.

11. Hydraulic Elevator

Hydraulic elevators recently announced by Montgomery Elevator Co., Moline, Ill., are for either freight or passenger service. Their travel is limited to 36 ft.

Self-adjusting V packing is used at the cylinder head of each elevator. It conforms to the contour of the plunger,

reducing friction and keeping the pit dry without using a drip pan. Cylinder is protected against corrosion through the use of a mastic coating. Casing of the well hole is eliminated except in severe conditions.

12. Air Vise

Operated by a leather cup piston assembly, an air vise manufactured by Production Devices Inc., Whitehall, N. Y., features a movable jaw adjustable to ¼-in. motion anywhere in the maximum 2-in. jaw opening. By removing the stroke limit screw, the full 2 in. stroke may be obtained. Gripping force of the vise on work is five times air pressure. Its jaw width is 3 in. The vise referred to as the Airlox, is also supplied with a 5-ft hose and a latching foot valve.

13. Adjustable Drill Head

Commander Mfg. Co., 4225 West Kinzie Street, Chicago 24, announces a new 8-spindle MultiDrill, which increases the productive drilling capacity of single

spindle drill presses eight times. Quickly and easily attached to any drill press, it will drill eight holes at one stroke in any hold pattern on or within a 9 in. circle. Minimum center distance is ½-in.

Fast positioning of the spindles to any hold pattern is accomplished by loosening one nut on each of the eight locating arms, positioning the spindle, and tightening the nut.

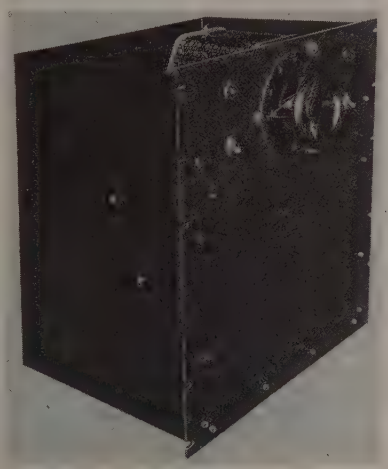
14. Brass Collets

Precision brass draw-in collets are announced by South Bend Lathe Works, 90 East Madison street, South Bend 22, Ind. According to the maker, when worn, these can be rebored to a larger diameter. They also may be machined for holding tapers or irregular shapes.

Collets are made in standard fractional sizes, 1/16-in. capacity up to the maximum capacity of the collet in increments of 1/64-in. They are also available with decimal hole sizes for any diameter between 0.0625-in. and the maximum capacity of the collet. Collets with metric hole sizes are supplied in increments of 1/2-mm, any size between 1.5 mm and the maximum metric collet capacity.

15. DC Power Supply

Superior Electric Co., 140 Church street, Bristol, Conn., offers a line of direct current power suppliers designed for continuous duty. The 0 to 3000 v unit shown is easily adjusted providing



a maximum direct output of 0.5 amp. It operates from a 115 v, single phase, 50/CO cycle source.

Full wave bridge rectifier consisting of four type 866/866A tubes is incorporated in the unit along with time delay relay. The latter allows filaments to be heated adequately before high voltage is applied. Line fuses are included for protection against overload conditions.

Power supply is designed to mount in a standard 19-in. relay rack panel. Three controls and two indicator lamps are mounted on its panel.

16. Skid Platform Box

A collapsible metal box for use with skid platforms is announced by Market Forge Co., Everett, Mass. Panels for the sectional boxes are 12 in. high and

are provided with steel loops that engage with the pipe-stakes in the skid platform. Panels may be built up to any height.

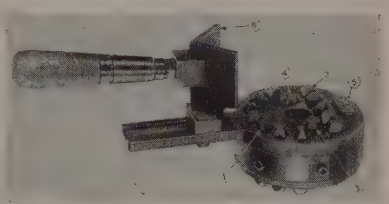
Because of design and construction and interlocking character of the panels, each serves to reinforce the adjacent panel. Skids may be equipped with sides, or ends only or any portion of either may be left out for ease in handling load. Wooden or metal shelves may be inserted between the panels. Boxes can be tiered one on top of the other.

17. Stainless Electrodes

Line of stainless steel electrodes in a full range of grades and diameters is announced by Air Reduction Sales Co., 60 East 42nd street, New York 17. For direct current application, all rods in the line are furnished with lime type coatings. For both alternating or direct-current use, they are furnished with lime-titania coatings—except those of straight chromium analyses. Features of the lime-titania types are easy slag removal, elimination of arc blow when used with alternating current, more uniform arc action and better appearance of the deposit.

18. Axle Marking Tool

A tool for faster marking of end faces of axles and shafts has been designed by M. E. Cunningham Co., 172 Carson street, Pittsburgh 19. It provides for a complete marking set-up at one time. Special individual friction springs are



used to hold stamps in place. These are quickly changed by pushing out one stamp and inserting another. A special adjustable V gage is provided for positioning the marking properly on different sizes.

Each stamp must be struck individually but since all stamps are in position for use, the total time involved for the complete marking is reduced 25 to 50 per cent. Also a clear, even, and perfectly positioned marking is assured on every axle, making the proper reading of the mark much easier and more positive.

19. Hydraulic Cylinders

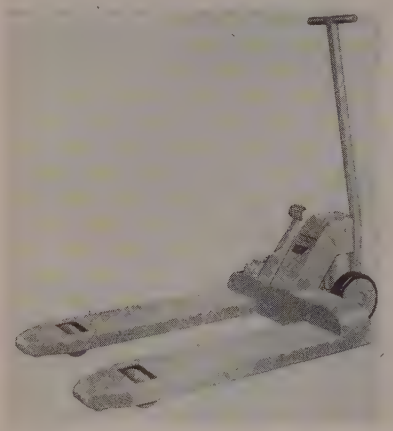
Hydraulic cylinders with seven standard mountings that cover most needs in initial equipment are announced by National Hydraulic Co. Inc., 4505 Oakwood boulevard, Melvindale, Mich. They are furnished in bore sizes of 1 to 12 in., with strokes of any length and operating pressures up to 1500 psi with a 5-1 factor of safety.

Other features include cast Meehanite heads, long bronze side-thrust bearings,

special alloy steel rods, alloy steel seamless tubing bored and honed to a mirror finish. Special cylinders are designed for special tooling, including forged cylinders for high commercial pressures.

20. Pallet Lift Truck

New design, construction and operational features are offered by Lyon-Raymond Corp., 3251 Madison street, Greene, N. Y., in their new 2000 lb capacity hand pallet truck. Working parts are totally enclosed for protection. Frame consists of high strength alloy sheet



steel formed into box sections. Two men can load the truck from ground level into a highway truck.

Hydraulic foot pump is used to elevate the truck's load. Length of stroke is optional, depending on the stature of the operator. Load is lowered by pushing the foot pedal forward. A relief valve on the pump prevents overloading and possible damage.

21. Dirt Mover, Scraper

New small model D Tournapull for high-speed dirt moving, developed by R. G. Le Tourneau Inc., Peoria, Ill., is self-loading, has four speeds forward, four reverse and travels up to 23 mph. One of its features is a new electric control that eliminates the need of a power control unit for scraper operation. Operator steers,

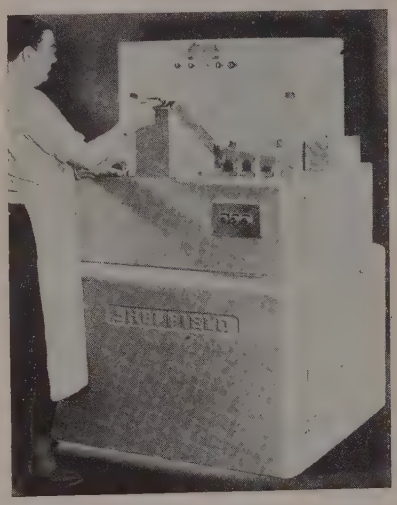
shifts and handles all scraper controls by buttons on the electric control panel. Prime mover is powered by an 85 hp gasoline motor. Its differential keeps both wheels pulling at all times, its design being of the type that on slippery going the most power is supplied to the wheel on firmest footing. Neither wheel spins independently of the other.

Ability to turn on a 25-ft fill and to turn in its own length from a full stop makes this small, fast rig extremely maneuverable. Overall dimensions are: Length 22 ft 5 in.; height 7 ft 4 in.; wheelbase 13 ft 2 in.; width of cutting edge 6 ft and weight empty 7½ tons.

22. Gaging Machine

An Airlectric automatic gaging machine that checks the average outside diameters of pistons and segregates them into eight classes is reported by Sheffield Corp., Dayton, O. It checks and classifies shock absorber pistons at the rate of 3600 per hour.

After the pistons are ground, they proceed on a conveyor belt to the operator of the gaging machine who places them in a chute. The parts then proceed



under an Electrichek gaging head that automatically rejects any excessively oversize parts. The remainder of the parts are removed from the gaging station and inserted in a tungsten carbide air ring which is connected to a series of Airlectric gaging heads that determine the size of the part and lights one of the individual signal lights located directly behind the chute. Each light has a prearranged color band around the diffusing lens to indicate the size of the part. The lights come on only if the part is within the minimum and maximum tolerance limits. This permits the operator of the machine to determine the size of the pistons, and to inform the operator of the grinder to what range he is grinding parts.

23. Cut-Off Wheel

Designed on the same principle as the ripsaw used in woodworking, the new Ripper abrasive cut-off wheel announced by American Emery Wheel Works, Richmond Square, Providence 1, R. I., has a "set" which allows it to cut cooler and faster and last longer. The sides of the wheel are made with radial depressions 0.006 to 0.008-in. deep, extending from the flange area to the edge of the wheel. Minimum thickness of wheel is 1/16 in. in 6 in. and 3/32-in. in 8, 10 and 12 in. sizes. It is manufactured in sizes 6 to 1[illegible] in. diameter in various grits and grades to cut all materials from steel to stone.

24. WELDING TORCH ACCESSORY

Affording double duty for oxyacetylene welding torches, the Cesco Puddler developed by Cesco Products Inc., 3[illegible] North LaSalle street, Chicago 2, fits over the end of any standard torch tip. Used with acetylene alone, it provides a flame suitable for body soldering, tinning, silver soldering and heating jobs. Development includes two tips, one for light duty soldering and one for body soldering.

25. PLATING TANK GRIDS

Rubber linings of plating and pickling tanks are protected against damage by heavy or sharp parts by seamless rubber covered mesh grids manufactured by Automotive Rubber Co. Inc., 8615 Epworth boulevard, Detroit 4. Grids are constructed of expanded metal reinforced with angle iron and supported on channel iron. Lifting eyes are provided for removing grids.

26. DUST MASK

Facial and respiratory protection against dusts without obstructing vision is possible with the Fulface dust mask produced by Mine Safety Appliances Co. Pittsburgh 8. Features are light weight, flexibility, gas-tight seal and replaceable filters in aluminum containers. Rubber air deflectors direct incoming air over inside surface of lens, preventing fogging.

27. CALCULATOR

Simple calculator, called the Dilut-O-Graph, makes it possible to compute quantities in a matter of seconds when mixing or diluting oils. Given the recommended mixing proportions and the capacity of the tank, the calculator shows how much base oil to use. Circular in shape and measuring 4½-in. in diameter it is offered gratis from D. A. Stuart Co., Chicago.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in this card. It will receive prompt attention.

Inflationary Forces Pushing Prices Higher on Metallics

Spiral continuing in scrap market. Pig iron quoted several dollars per ton higher with ferroalloys up and nonferrous metals rising. Active second quarter steel demand seen. Easing in pressure expected by midsummer

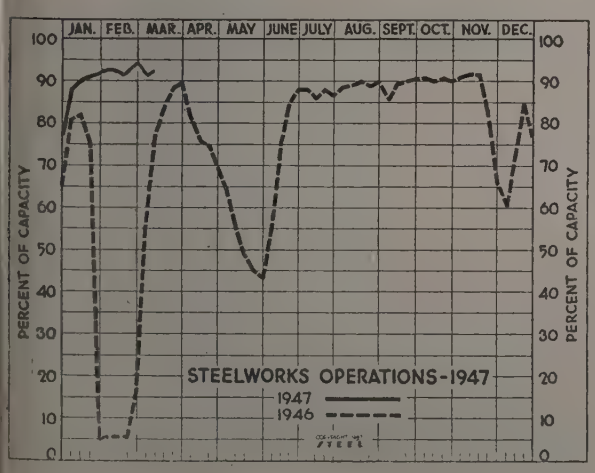
INFLATIONARY forces in the metallics markets are pushing prices to higher levels on a broad front with accompanying uncertainty and confusion in steel and metalworking circles. Meanwhile, adverse weather continues to hamper steel shipments, while industrial gas shortages are seriously curtailing manufacturing operations.

Last week, pig iron went up several dollars a ton, scrap continued to spiral at various centers, upward adjustments were effected on important ferroalloys, and lead, copper and silver hit new postwar highs. All in all, the various metallics markets presented every appearance of boom.

The surge in scrap is unchecked and features the inflationary trend in metallics generally. Scrap, however, is believed reaching a point where a leveling off in prices can be expected, if not a reaction. Many trade leaders think the market has moved too fast to higher levels to hold for long, especially with spring just around the corner with its traditional improved flow of material.

At the same time, consumers and sellers are reported increasingly impressed with the fallacy of current buying policies, notably trade-in transactions and excessive cross-hauling which largely have contributed to the spirited bidding for material and the accompanying price swirl.

Pig iron was advanced $2.50 to $4 per ton by important sellers last week in the face of improved production. Highly accelerated demand, far above previous peacetime experience, the scrap shortage and rising costs explain this move.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended March 8	Change	Same Week 1946	Same Week 1945
Pittsburgh	94.5	None	88	90.5
Chicago	93	+ 1	74	100.5
Eastern Pa.	88	None	73	91
Youngstown	90	+ 1	75	92
Wheeling	89	— 4.5	90.5	68.5
Cleveland	91	+ 0.5	88.5	93.5
Buffalo	88.5	— 2	63	90.5
Birmingham	99	None	86	95
New England	90	— 2	87	92
Cincinnati	91	+ 4	81	72
St. Louis	74.5	None	63.1	80
Detroit	87	None	88	86
Estimated national rate	93	+ 0.5	77.5	95

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Another quarter of active steel demand is in prospect. Again steelmakers generally will have substantial tonnage carryover, though arrearages are not expected to be as heavy as at the beginning of the year. Demand for most products is expected to exceed supply through first half of the year. However, sustained steelmaking operations at the high rate in effect since January is seen easing demand pressure on many products by midsummer. This, of course, hinges upon averting serious labor trouble and production interruptions. The decision of the Supreme Court last week in the coal case is considered heartening in this regard. At any rate, prospects for an easing in the supply-demand situation are believed promising with consumer pressure reported easing at the moment on alloy steels, wire specialties and large carbon rounds.

Details of the enlarged freight car building program remain to be worked out. Steel producers are willing to go along on the 10,000-unit monthly plan but are not disposed to commit themselves definitely on the needed steel until the original 7000-car monthly schedule has been reached.

Steel production fell behind schedule last week because of adverse weather which hampered transportation and curtailed industrial gas supply at some steelmaking centers. However, the estimated national ingot operating rate rose ½ point to 93 per cent on gains of 4 points to 91 per cent at Cincinnati, 1 point to 93 per cent at Chicago, 1 point to 90 per cent at Youngstown, and ½ point to 91 per cent at Cleveland. Declines were recorded at Wheeling, off 4.5 points to 89 per cent, at Buffalo, down 2 points to 88.5 per cent, and 2 points to 88.5 in New England. Operations held unchanged elsewhere.

STEEL's composite price averages rose to $31.80 from $29.67 on steelmaking pig iron, and to $35.58 from $34.33 on steelmaking scrap. Finished steel composite held unchanged at $69.73 as did semifinished steel at $52.10.

COMPOSITE MARKET AVERAGES

	Mar. 8	Mar. 1	Feb. 22	One Month Ago Feb., 1947	Three Months Ago Dec., 1946	One Year Ago Mar., 1946	Five Years Ago Mar., 1942
Finished Steel	$69.73	$69.73	$69.73	$69.73	$64.75	$63.54	$56.73
Semifinished Steel	52.10	52.10	52.10	52.10	41.10	40.60	36.00
Steelmaking Pig Iron	31.80	29.67	29.56	29.56	29.10	25.13	23.00
Steelmaking Scrap	35.58	34.33	33.85	32.73	27.69	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	March 8, 1947	Feb., 1947	Dec., 1946	Mar., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.55c	2.50c
Steel bars, Philadelphia	2.98	2.98	2.91	2.82
Steel bars, Chicago	2.60	2.60	2.55	2.50
Shapes, Pittsburgh	2.50	2.50	2.35	2.35
Shapes, Philadelphia	2.64	2.64	2.48	2.465
Shapes, Chicago	2.50	2.50	2.35	2.35
Plates, Pittsburgh	2.65	2.65	2.50	2.50
Plates, Philadelphia	2.85	2.85	2.558	2.55
Plates, Chicago	2.65	2.65	2.50	2.50
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.48	2.425
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.19	3.275
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	†3.675	†4.05
Sheets, hot-rolled, Gary	2.50	2.50	2.481	2.425
Sheets, cold-rolled, Gary	3.20	3.20	3.218	3.275
Sheets, No. 10 galv., Gary	3.55	3.55	†3.675	†4.05
Hot-rolled strip, Pittsburgh	2.50	2.50	2.462	2.35
Cold-rolled strip, Pittsburgh	3.20	3.20	3.162	3.05
Bright basic, bess. wire, Pittsburgh	3.425	3.425	3.05	3.05
Wire nails, Pittsburgh	4.125	4.125	3.75	3.25
Tin plate, per base box, Pittsburgh	$5.75	$5.75	*$5.25	*$5.25

* Nominal. † Base changed in December to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$50.00	$50.00	$38.00	$38.00
Slabs, Pittsburgh, Chicago	42.00	42.00	39.00	39.00
Rerolling billets, Pittsburgh	42.00	42.00	39.00	39.00
Wire rods ¼ to 9/32-inch, Pitts.	2.675c	2.675c	‡2.425c	‡2.30c

‡ Base, No. 5 to 5/16-in.

Pig Iron

	March 8, 1947	Feb., 1947	Dec., 1946	Mar., 1946
Bessemer, del. Pittsburgh	$34.83	$31.83	$31.77	$27.315
Basic, Valley	30.00	30.00	29.50	25.625
Basic, eastern del. Philadelphia	32.72	32.01	31.93	27.465
No. 2 fdry., del. Pgh. N. & S. sides	34.33	31.33	31.27	26.815
No. 2 fdry., del. Philadelphia	33.22	32.51	32.43	27.965
No. 2 foundry, Chicago	33.00	30.50	30.00	26.125
Southern No. 2 Birmingham	29.88	26.88	26.88	26.565
Southern No. 2, del. Cincinnati	34.75	31.75	30.94	27.965
Malleable, Valley	30.50	30.50	30.00	26.125
Malleable, Chicago	33.50	30.50	30.00	26.125
Charcoal, low phos., fob Lyles, Tenn.	37.50	37.50	37.50	37.340
Gray forge, del. McKees Rocks, Pa.	30.66	30.66	30.61	26.315
Ferromanganese, fob cars, Pittsburgh	140.25	140.25	140.00	140.000

Scrap

Heavy melting steel, No. 1, Pittsburgh	$35.00	$33.75	$28.50	$20.00
Heavy melt. steel, No. 2, E. Pa.	39.25	33.25	27.38	18.75
Heavy melting steel, Chicago	32.50	31.25	27.19	18.75
Rails for rolling, Chicago	38.50	38.50	31.00	22.25
No. 1 cast, Chicago	42.50	42.50	36.90	20.00

Coke

Connellsville, furnace ovens	$8.875	$8.875	$8.75	$7.50
Connellsville, foundry ovens	10.375	9.875	9.50	8.25
Chicago, by-product fdry., del.	16.10	16.10	15.288	13.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45; eastern Mich., $46.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53; eastern Mich., $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64; eastern Mich., $65.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66, Portsmouth, O.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, lb 2.35c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 7/32 to ½-in., inclusive, $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, Duluth, base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Phila., del., 2.98c, San Francisco (base, del.), 3.33-3.65c; Los Angeles (base, del.), 3.325-3.56c; Seattle, 3.285c, base.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, 2.65c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c; Seattle, 2.985c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c; Detroit, del., 2.75c; eastern Mich. and Toledo, del., 2.80c.

Iron Bars: Single refined, Pittsburgh, 6.15c-†6.70c; double refined, 7.00c-†8.50c; Pittsburgh, staybolt, 7.85c-†10.00c.

† Hand puddled.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c. (Andrews Steel Co., quotes on Middletown, O., base for shipment to Detroit area; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point, Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit, del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55c.

Culvert Sheets, No. 16, not corrugated, copper alloy: Pittsburgh, Chicago, Gary, Birmingham, 4.15c; Granite City, 4.25c; copper iron 4.50c; pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils or cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 3.55c; Granite City, base, 3.65c; Detroit, del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: 4.20c, Pittsburgh, Chicago, Gary; 4.30c, Kokomo, Ind. Armature: 4.50c, Pittsburgh, Chicago, Gary; 4.60c, Granite City, Ill., Kokomo, Ind. Electrical: 5.00c, Pittsburgh, Chicago, Gary; 5.10c, Granite City, Kokomo. Motor: 5.75c, Pittsburgh, Chicago, Gary; 5.85c, Granite City. Dynamo: 6.45c, Pittsburgh; 6.55c, Granite City. Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 52, 9.15c, Pittsburgh.

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh.)

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago, base, 3.30c; Detroit, del., 3.35c; eastern Mich., 3.40c; Worcester, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.20c; over 0.40 to 0.60 carbon, 4.70c; over 0.60 to 0.80, 5.30c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.93, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.60c; Granite City, Birmingham, Sparrows Point, 3.70c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-base box $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I. C. 8-lb $13.50; 15-lb $15.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.65c; Coatesville, Claymont, Geneva, Utah, 2.80c; New York, del. 2.94c; Phila., del., 2.85c; St. Louis, del., 2.47c; Boston, del., 2.86c. San Francisco and Los Angeles, del., 3.46-3.52c. (Central Iron & Steel Co., Harrisburg, Pa., 3.40c, basing points; Alan Wood Steel Co., Conshohocken, Pa., 2.80c, Coatesville and Claymont equivalent.)

Floor Plates: Pittsburgh, Chicago, 3.90c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.787c; Coatesville, 4.15c.

Clad Steel Plates: Coatesville, 10% cladding: nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.50c; Geneva, Utah, 2.65c; New York, del., 2.70c; Phila., del., 2.64c. San Francisco and Los Angeles, del., 3.37c-3.41c.

(Phoenix Iron Co., Phoenixville, Pa., nominally, 3.05c, Bethlehem, Pa., equivalent.)

Steel Piling: Pittsburgh, Chicago, Buffalo, $3 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer .....*$3.30-$3.55
Spring (except Birmingham) **$4.25

Wire Products to Trade

Nails and Staples

Standard and cement-coated.....†$3.75-$4.50
Galvanized .....‡$3.75-$4.50

Wire, Merchant Quality

Annealed (6 to 8 base) ..... §$3.95
Galvanized (6 to 8 base) ..... §$4.40
(Fob Pittsburgh, Chicago, Birmingham, per base column)
Woven fence, 15 gage and heavier..... ††84
Barbed wire, 80-rod spool ..... ††94
Barbless wire, twisted 94
Fence posts (no clamps) ..... ††82
Bale ties, single loop ..... ††86

* Worcester, $3.40, Duluth, $3.35, base. San Francisco (base, del.) $4.31 for bright basic only.

** Worcester $4.35, Duluth and Trenton, N. J., $4.50, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28, black premier.

† Worcester $4.05, Cleveland $3.85, base. San Francisco (base del.) $4.83.

‡ Duluth $3.75, Cleveland $3.85, base. San Francisco (base, del.) $4.83.

§ Worcester $4.05, annealed, $4.50, galvanized. Duluth $3.95, annealed; $4.40, galvanized base. San Francisco (base, del.) $4.96, annealed; $5.41, galvanized.

†† San Francisco (base, del.): Woven fence, 107; barbed wire, 114; bale ties, 110. Duluth (base): Woven fence, 84; barbed wire, 94; fence posts, 90.

Rails, Supplies

Rails: Standard, over 60-lb. fob mill, $2.50 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $2.85 per 100 lb; light rails (rail steel), $2.95, Williamsport, Pa.

Relaying, 35 lb and over, fob railroad and basing point, $43-$46 per net ton.

Supplies: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill; $3.15 base, Seattle. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	¼	— 2	+20
¼ & ⅜	51	30½	⅜	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless Steel

In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

	——Seamless——		—Elec. Weld—	
O.D.	Hot	Cold	Hot	Cold
Sizes B.W.G.	Rolled	Drawn	Rolled	Drawn
1" 13	....	$10 89	$10.62	$10.62
1¼" .. 13	....	12.90	10.59	12.58
1½" .. 13	$12.00	14.26	11.70	13.90
1¾" .. 13	13.65	16.23	13.31	15.82
2" 13	15.29	18.17	15.00	17.95
2¼" .. 13	17.05	20.26	16.71	20.00
2¼" .. 12	18.78	22.31	18.38	22.00
2½" .. 12	20.57	24.43	20.11	24.07
2¾" .. 12	21.80	25.89	21.27	25.46
3" 12	22.87	27.18	22.26	26.68
3¼" .. 11	26.88	31.94	26.15	31.33
3½" .. 11	28.86	34.30	28.06	33.64
4" 10	35.82	42.55	34.78	41.68
4½" .. 9	47.48	56.42	....	....
5" 9	54.96	65.30	....	....
6" 7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine

½-in. and smaller; up to 6 in. in length 55 off
⅝ and ¾, up to 6 in. in length ..... 52 off
¾ x 6 in. ..... 49 off
⅞ and 1 in. x 6 in. length ..... 51 off
1⅛ in. and larger in all lengths and ⅛ in. and larger in lengths over 6 in. ... 48 off
⅛ in. and smaller, longer than 6 in. .. 45 off
Tire bolts .....38½ off
Step bolts ..... 46 off
Plow bolts ..... 57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
⅞-in. and smaller.....	51 off	.....
1-in. and smaller.....	.....	48 off
⅛-in.-1-in.	48 off	.....
⅛-in.-1-in.	.....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	.....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright).... 56 off
Upset (10-35 heat treated)
⅝ x 6 ..... 51 off
¾, ⅞ & 1 x 6 ..... 47 off

Square Head Set Screws

Upset 1-in. and smaller ..... 61 off
Headless, ¼-in. and larger ..... 46 off
No. 10 and smaller ..... 56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham

Structural 5.25c
Lebanon, Pa. 5.40c
⅞-in and under .....55-5 off
Lebanon, Pa. .....55-5 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl .....$1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
...	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Grade	Bars, Drawn Wire, Structurals	Plates	Sheets	Hot Rolled Strip	Cold Rolled Strip
	Base, Cents per lb				
	CHROMIUM NICKEL STEELS				
301....	26.00c	29.50c	37.00c	22.00c	28.00c
302....	26.00	29.50	37.00	23.50	30.50
303....	28.50	31.50	39.00	29.50	36.00
304....	27.50	31.50	39.00	25.50	32.50
308....	31.50	37.00	44.50	31.00	38.00
309....	39.00	43.50	51.00	40.50	51.00
310....	53.50	56.50	57.50	53.00	61.00
316....	43.50	48.00	52.00	43.50	52.00
321....	31.50	37.00	44.50	32.00	41.50
347....	36.00	41.50	49.00	36.00	45.50
431....	21.00	24.00	31.50	19.00	24.50
440A ..	26.00	31.00	36.50	26.00	30.50
	STRAIGHT CHROMIUM STEEL				
403....	23.50	27.00	32.00	23.00	29.50
410....	20.50	23.50	29.00	18.50	24.00
416....	21.00	24.00	29.50	20.00	25.50
420....	26.00	31.00	36.50	26.00	39.50
430....	21.00	24.00	31.50	19.00	24.50
430F...	21.50	24.50	32.00	20.50	27.00
442....	24.50	28.00	35.50	26.00	35.00
443....	24.50	28.00	35.50	26.00	35.00
446....	30.00	33.00	39.50	38.00	56.50
*501..	9.00	13.00	17.50	13.00	18.50
*502..	10.00	14.50	18.50	14.50	19.50
	†STAINLESS CLAD STEEL (20%)				
304....	....	24.00	22.00	....	....
410....	....	22.00	20.00	....	....
430....	....	22.50	20.50	....	....
446....	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

Metallurgical Coke

	Price Per Net Ton
	Beehive Ovens
Connellsville, furnace	*$8.75-$9.00
Connellsville, foundry	9.75-11.00
New River, foundry	11.75
Wise county, foundry	11.15
Wise county, furnace	10.65

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

Coke By-Products

Spot, gal, freight allowed east of Omaha

Pure and 90% benzol 17.00c
Toluol, two degrees 22.00c
Industrial xylol 22.00c
Solvent naphtha 26.00c

Per pound fob works

Phenol (car lots, returnable drums).... 11.25c
Do., less than carlots 12.00c
Do., tank cars 10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers. "household use" 9.50c

Per ton, bulk, fob plants

Sulphate of ammonia $30.00

PIG IRON

Prices per gross ton. Minimum delivered prices do not include 3 per cent federal tax.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.34	32.84	34.34	35.54
Brooklyn N. Y., del.	34.50			35.00
Philadelphia, del.	33.22	32.72	34.22	33.72
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Birmingham, base	29.88	29.38	34.50	....
Baltimore, del.	36.28	....	....	....
Chicago, del.	34.12	....	....	....
Cincinnati, del.	34.75	34.25	....	....
Newark, N. J., del.	35.96	....	....	....
Philadelphia, del.	35.13	34.63	....	....
St. Louis, del.	33.87	33.37	....	....
Buffalo, base	33.00	32.50	34.00	33.50
Boston, del.	39.48	38.98	40.48	39.98
Rochester, del.	34.84	34.34	35.84	35.34
Syracuse, del.	35.50	35.00	36.50	36.00
Canton, Massillon, fob furnace	33.00	32.50	....	33.50
Chicago, base	33.00	33.00	34.00	33.50
Milwaukee, del.	34.32	34.32	35.32	34.83
Muskegon, Mich., del.	36.83	....	....	37.33
Cleveland, fob furnace	33.00	32.50	34.00	33.50
Akron, del.	35.17	34.17	35.67	35.17
Duluth, base	33.50	33.00	34.50	34.00
Erie, Pa., base	33.00	32.50	34.00	33.50
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	33.50	33.00	31.00	33.50
St. Louis, del.	34.25	33.75	....	34.25
Neville Island, Pa., base	33.50	33.00	34.00	33.50
Pittsburgh, del., N. & S. sides	34.33	33.83	34.83	34.33
Provo, Utah, base	30.50	30.00	....	....
Sharpsville, Pa., base	33.50	33.00	34.00	33.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	35.50	....	36.50	36.00
Troy, N. Y., base	34.50	34.00	35.50	35.00
Toledo, O., base	33.00	32.50	34.00	33.50
Cincinnati, del.	36.50	36.00	....	....
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	33.48	32.98	33.98	33.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Ookmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base).....$38.00

6.51-7.00	$39.00	9.01- 9.50	44.00
7.01-7.50	40.00	9.51-10.00	45.00
7.51-8.00	41.00	10.01-10.50	46.00
8.01-8.50	42.00	10.51-11.00	47.00
8.51-9.00	43.00	11.01-11.50	48.00

Fob Jackson, O., per gross ton, Buffalo base $3.75 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa; $54, Buffalo and Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., $36; Buffalo, Troy, N. Y., Birdsboro, Pa., $39, base; Philadelphia, $38.16, del. Intermediate phosphorus, Central furnace, Cleveland, $36.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point
Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$81.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	65.00
Ala., Ga.	65.00
N. J.	70.00

Intermediate Heat Duty

Ohio	57.00
Pa., Ill., Md., Mo., Ky.	59.00
Ala., Ga.	51.00
N. J.	62.00

Low Heat Duty

Pa., Md., Ohio	51.00

Malleable Bung Brick

All bases	75.00

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press	42.00
Wire Cut	40.00

Silica Brick

Pennsylvania	65.00
Joliet, E. Chicago	74.00
Birmingham, Ala.	65.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	22.00
Bags	26.00

Basic Brick

Net ton, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.55
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	14.00

Foreign Ore

Cents per unit, cif Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.	Nom.
N. African low phos.	Nom.
Swedish basic, 60 to 68%	13.00
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27-$27.50
45% no ratio	28.00
48% no ratio	30.00
50% no ratio	31.00

Brazilian—nominal

44% 2.5:1 lump	$33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00

Domestic (seller's nearest rail)

48% 3:1	$39.00

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported manganese ore is fob cars, shipside, at dock most favorable to the buyer. Outside shipments direct to consumers at 15c per unit less than Metals Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds.

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	3.75-3.85	3.75-3.85	3.75-3.85	3.85	3.85	3.75-3.85	...	...	...
Cold-Rolled	4.55-4.75	4.55-4.75	4.55-4.75	4.75	...	4.55-4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75-3.85	3.75-3.85	3.75-3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes	4.00	4.00	4.00	4.00	...	4.00	4.00	4.00	4.00

Note: Lower level of quoted ranges represent prices for NAX High Tensile, produced by Great Lakes Steel Corp., Detroit.

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	C-R	H-R	C-F	H-R Alloy ($4140)	Structural Shapes	Carbon 3/8"-3/4"	Floor 3/8" & Thicker
Boston (city)	4.50	....	5.22[4]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
††New York (city)	4.42	....	5.27[3]	5.47[5]	....	4.62	....	4.62	5.42	8.42[12]	4.37	4.72	6.35
New York (country)	4.32	....	5.17[3]	5.37[5]	....	4.52	....	4.52	....	....	4.27	....	6.25
Philadelphia (city)	4.24	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.30	5.83
Baltimore (city)	4.09	6.15[8]	5.65[8]	5.14[5]	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	6.05[8]	5.55[8]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
Buffalo (city)	4.00	....	4.70[6]	4.35[5]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Pittsburgh (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Youngstown, O. (city)	4.188	5.338	4.888	5.05	6.30	4.00	....	4.238	5.138	....	4.218	4.488	5.178
Youngstown, O. (country)	....	....	....	4.95	6.20	3.90	....	....	....	....	....	....	....
Detroit	4.15	5.30	4.85	5.42	6.67	4.34	5.24	4.20	5.12[12]	7.01	4.42	4.59	5.92
Cleveland (city)	4.00	5.15[8]	4.70[8]	5.238[5]	6.488[5]	4.00	5.05	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05[8]	4.60[8]	....	....	3.90	4.95	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	5.05	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.95	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	4.199	5.349[8]	4.899[8]	5.249[5]	6.499[5]	4.199	5.249	4.249	5.149	6.899	4.249	4.499	5.899
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[13]
Indianapolis	4.04	....	4.84[8]	5.29[5]	6.54[5]	4.24	....	4.36‡‡	5.26	....	4.36	4.61	6.01
St. Louis	4.199	....	4.899[9]	....	6.674[5]	4.199	....	4.249	5.324[13]	7.074	3.999	3.999	5.999
Birmingham (city)	3.85[20]	....	....	5.20[5]	....	4.10[20]	....	4.05[20]	5.83	....	4.05	4.30	6.56
Birmingham (country)	3.75[20]	....	....	5.20[6]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	....
New Orleans	4.46**	....	5.77[8]	....	....	4.83[20]	....	4.78**	6.14[11]	....	4.68**	4.83[20]	6.94[20]
Houston, Tex.	4.50[1]	....	....	....	6.00[12]	5.80[1]	....	***	....	....	....	5.60	6.40
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	..	4.918	5.168	6.568
Los Angeles	5.55	....	7.10[8]	....	8.10[5]	5.65	8.35	5.10	6.90[19]	7.85	5.20	5.20	7.20
San Francisco	4.90§§	....	6.30[8]	....	7.35[5]	5.20[14]	8.35	4.75[14]	***	9.35[10]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]
Seattle	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any quantity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [5]—450 to 1499 pounds; [6]—one bundle to 1499 pounds; [7]—one to nine bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 39,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over; [13]—400 to 14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]1500 to 39,999; [20]—400 to 3999 pounds.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ basing point cities with quotations representing mill prices plus warehouse spread; § as rolled, except New York, Jersey City, Indianapolis and San Francisco where price represents annealed bars; ** add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier; *** rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over 6 in. 8.25c at San Francisco; bar size angles, flats, rounds 5.00c, squares and half ovals 5.15c and bar size channels 5.55c at Houston.

Open Market Prices of Leading Ferroalloy Products

Spiegeleisen: 19-21% carlot per gross ton, Palmerton, Pa., $40; Pittsburgh, $44.

Ferromanganese, standard: 78-82% c.l. gross ton, duty paid, $135 fob cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer, Birmingham, Ala. (where Sloss-Sheffield Steel & Iron Co. is producer); $140.25 fob cars, Pittsburgh, including 75c switching charge, (where Carnegie - Illinois Steel Corp. is producer); add $8 for packed c.l., $10 for ton, $13.50 for less ton; $1.70 for each 1%, or fraction contained manganese over 82% or under 78%.

Ferromanganese, low carbon: Eastern zone: Special, 21c; regular, 20.50c; medium, 14.50c; central zone: special, 21.30c; regular, 20.80c; medium, 14.80c; western zone: Special, 21.70c; regular, 21.20c; medium, 15.20c. Prices are per pound contained Mn, bulk carlot shipments, fob shipping point, freight allowed. Special low-carbon has content of 90% Mn, 0.10% C, and 0.06% P.

Ferromanganese Briquets: (Weight approx. 3 lb and containing exactly 2 lb Mn) Prices per lb of briquets: Contract, carlots, bulk 6.40c, packed 6.90c, ton lots 7.30c, smaller lots 7.70c, eastern, freight allowed; 6.65c, 7.15c, 7.90c and 8.30c, central; 7.20c, 7.70c, 9.80c and 10.20c, western; spot up 0.25c; notched up 0.25c.

Ferrotungsten: Spot, 10,000 lb or more, per lb contained W, $2; contract, $1.98; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb contained Ti; ton lots $1.23; smaller lots $1.25; eastern. Spot up 5c per lb.

Ferrotitanium: 20-25%, 0.10 maximum C; per lb contained Ti; ton lots $1.35; smaller lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V .35-.55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.95c, ton lots 13.45c, smaller lots 13.95c; 80-90%, c.l. 11.35c, ton lots 11.90c, smaller lots 12.45c; 75%, c.l. 10.15c, ton lots 10.75c, smaller lots 11.35c; 50% c.l. 8.45c, ton lots 9.10c, smaller lots 9.75c. Deduct 1.0c for bulk carlots 75%, 80-90%, 90-95%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, smaller lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; smaller lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots.

High carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c; add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, smaller lots 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, smaller lots 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 20.00c, packed 20.15c; ton lots 21.00c, smaller lots 22.00c, eastern, freight allowed, per pound contained Cr; 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, smaller lots 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c, smaller lots 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, smaller lots 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 13.65c; 2000 lb to c.l., 15.05c; central zone, 14.25c and 17.30c; western, 14.85c and 19.05c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 13.15c, 2000 lb to c.l. 14.65c; central, 13.85c and 16.90c; western, 14.45c and 18.65c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ½ lb Si eastern zone, bulk, c.l. 6.15c, ton lots 7.05c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Ferrosilicon: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.20c, ton lots 4.60c, smaller lots 5c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.35c, ton lots 4.75c, less 5.15c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy: Contract, 5 tons or more $1.90, 1 ton to 5 tons $2.00, smaller lots $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, smaller lots 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 12.50c, ton lots 13.25c, smaller lots 14.00c, eastern zone, freight allowed; 12.80c, 14.35c and 15.10c, central; 12.80c, 16.30c and 17.05c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract or spot, carlots, bulk 12.00c, packed 12.75c; ton lots 13.50c, smaller lots 14.25c, eastern zone, freight allowed; 12.30c, 13.05c, 14.60c, 15.35c, central; 12.30c, 13.05c, 16.65c, 17.30c, western.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) Prices per lb of alloy, contract or spot, carlots, bulk 11.75c, packed 12.50c, ton lots 13.25c, smaller lots 14.00c, eastern, freight allowed; 12.05c, 12.80c, 16.30c, 17.05c, western.

Zirconium Alloy: 12-15%, per lb of alloy, eastern, contract, carlots, bulk 4.85c, packed 5.30c, ton lots 5.65c, smaller lots 6.00c; spot up 0.25c.

Zirconium Alloy: Zr 35-40%, eastern, contract basis, carloads in bulk or package, per lb of alloy 14.50c, ton lots 15.75c, smaller lots 17.00c; spot up 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract basis fob Niagara Falls, N. Y., lump per lb 6.25c; ton lots 6.75c; smaller lots 7.25c. Spot up ½c.

Simanal: (Approx. 20% each Si, Mn, Al) Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Tungsten Metal Powder: Spot, not less than 98.8%, $2.65, freight allowed as far west as St. Louis.

Grainal: Vanadium Grainal No. 1 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

Vanadium Pentoxide, technical grade: Fused, approx. 89-92% V_2O_5 and 5.84% Na_2O; or air dried, 83-85% V_2O_5 and 5.15% Na_2O, $1.10 per lb contained V_2O_5 fob plant freight allowed on quantities of 25 lb and over to St. Louis.

Prices Rise in Nonferrous Metal Markets

Advances posted in copper, lead and silver on active demand . . . Tin stocks continue to decline

New York — Nonferrous metal prices turned upward last week on a broad front. Price range in copper was widened to 2 cents as American Smelting & Refining Co. and Phelps Dodge Corp. raised electrolytic copper to the basis of 21.50c while other leading sellers continued to quote 19.50c, delivered Connecticut Valley. Lead advanced to a new record high of 14.80c to 14.85c, East St. Louis, compared with the previous high of 12.00c, East St. Louis, in 1917. Silver continued its spectacular rise, selling up to 86.25c, representing a 15½ cent advance in less than two weeks. This is the highest price attained in the open domestic market since 1920 when $1.37 per ounce was quoted. Other major nonferrous metal prices held unchanged.

COPPER—The House Ways and Means Committee last week agreed without a formal vote to recommend legislation suspending for three years the 4-cent a pound tariff on copper imports.

According to Washington sources, the British government will increase its selling price of copper on the world market by £10, or about $40 a ton. Northern Rhodesian mines have been adversely affected by a shortage of coal. All mining operations at the Rhokana copper mine were closed down last week due to scarcity of coal.

LEAD — American Smelting & Refining Co. and St. Joseph Lead Co. raised prices 1 cent a pound last week to the basis of 15.00c, New York, and 14.80c to 14.85c, East St. Louis. In making the increase, American Smelting stated that since other sellers of imported lead are reported to have sold at the equivalent of 15.00c a pound, New York, the action was taken to bring the company's price in line.

Reaction in London to the American price advance was that it strengthens the belief that a further advance in the United Kingdom quotation will be made. The American quotation is equal to £83 15s and brings the Australian price to around £75 to £78 a ton, fob port, compared with the official level in London of £70 delivered.

Lead products, including sheet, pipe and lead oxides advanced 1 cent a pound here while corresponding adjustments were made in the extras for lead traps, bends and combination lead and iron bands and ferrules, and combination lead and iron ferrules.

ALUMINUM — Although this year's estimated aluminum production of 1.1 billion pounds will be more than three times that of 1939, output will fall short of the estimated 1947 requirements of 1.6 billion pounds, according to the Civilian Production Administration. Greater use of aluminum in prefabricated home building and the utilization of the metal for many new purposes keep its demand at a level far above prewar days.

Corrugated aluminum sheet is used for farm and industrial roofing and siding, and manufacturers predict that 2 million aluminum residential windows will be made in 1947. Thousands of aluminum boats, canoes, and sailboats are being sold monthly. Truck and trailer and bus manufacturers are calling for more aluminum to use in body and axle construction. Automotive and diesel pistons are made of aluminum, and the use of the metal for bearings and bushings is growing monthly. Twelve states will be using aluminum license plates during 1947-48.

Postwar domestic refrigerators will average five times as much aluminum per unit as prewar models, manufacturers predict, and a large quantity of the metal is going into clothesline wire, clothes pins, cigarette lighters, toothpaste and shaving cream tubes, milk bottle caps, and into foil packaging.

Bottlenecks blamed by CPA for holding production below the all-time high of 1.8 billion pounds produced in 1943 are: Lack of enough soda ash to meet capacity operating requirements; inability to buy electric power which will keep aluminum plants running at an economical rate; and fabricating differences between aluminum for military use and aluminum for civilian consumption have slowed down production. The Lister Hill, Alabama, plant which extracted alumina from bauxite ore during the war is idle while the following five aluminum plants also stand idle: Burlington, N. J., Los Angeles, Riverbank, Calif., Maspeth, N. Y., and St. Lawrence, N. Y.

TIN — Even with continuation of use controls, CPA estimates that the government's reserve stocks of tin, exclusive of those held for emergency stockpiling, will be exhausted by the end of 1947. It is evident that world production in 1947 will fall far short of consumption, even at controlled levels, making necessary large withdrawals from stocks. Total tin stocks in this country declined by nearly 14,000 tons in 1946. Because industry stocks already were at minimum working levels, the entire drop was in government stocks.

SILVER — Handy & Harman raised its official New York price for silver to 86.25c last week while the London market advanced to 49d for spot and 49d 6s for forward metal. Strength in the domestic market was attributed mainly to continued demand from abroad plus a satisfactory volume of buying from American makers of sterling silver flatware.

ZINC — Activity in the domestic zinc market remained quiet last week with producers holding prices unchanged on the basis of 10.50c, East St. Louis, for prime western. New Jersey Zinc Co. issued a new price list showing advanced prices for its 35 per cent and 50 per cent leaded zinc oxides, based on 14-cent lead and, hence, subject to further revision.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 19.50c-21.50c, del. Conn.; Lake, 21.62½c, del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c, 1000-4999 lb; 1½c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c-21.25c, refinery, 20,000 lb or more; 19.50c-21.50c, less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 21.50c; 88-10-2 (No. 215) 26.25c; 80-10-10 (No. 305) 24.50c; No. 1 yellow (No. 405) 17.00c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than 20 tons.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 16.37½c; No. 12 foundry alloy (No. 2 grade) 15.62½c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 17.00c; grade 2 (92-95%) 16.00c; grade 3 (90-92%) 15.25c; grade 4 (85-90%) 14.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lb) 20.50c per lb, carlots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 34.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straights), 70.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 69.87½c; Grade C, 99.65-99.79% incl. 69.62½c; Grade D, 99.50-99.64% incl., 69.50c; Grade E, 99-99.49% incl. 69.12½c. Grade F, below 99% (for tin content), 69.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 28.25c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 28.75c. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $86-$90 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.50-$1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.55-$1.80.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y. 86.25c per ounce.

Platinum: $57-$61 per ounce.

Palladium: $24 per troy ounce.

Iridium: $110 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; Yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35.79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28c, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c-27.72c, less carlots 26.02c-28.22c; weatherproof, fob eastern mills carlot 26.42c-28.12c, less carlots 26.92c-28.62c; magnet, delivered, carlots 28.93c-31.13c, 15,000 lb or more 29.18c-31.38c, less carlots 29.68c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.25-13.50c; over 12-in., 14.25-14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval, over 15 in., 36.87½c; flat untrimmed, 36.87½c; electrodeposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c, 500to 1000 lb, 85.25c, 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb drums, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ⅝c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz Metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A. B.	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.75, No. 2 copper 16.75, light copper 15.75, composition red brass 16.75, auto radiators 13.75, heavy yellow brass 12.25, brass pipe 12.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 19.25c; No. 2 copper, 17.75-18.25c; light copper 16.75-18.25c; refinery brass (60% copper), per dry copper content, 17.62½c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.75-12.25, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.50, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 11.75-12.00, battery plates 7.00-7.25, linotype and stereotype 14.00, electrotype 12.00, mixed babbitt 12.50, solder joints 14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 4.50-5.00, old die cast scrap 3.50-4.00.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.50-10.00, old sheets 7.50-8.00, crankcases 7.50-8.00, turnings 3.00, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

*PITTSBURGH:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1, 2 & 3 Bundles	35.00
Machine Shop Turnings	28.50-29.50
Mixed Borings, Turnings	28.50-29.50
Short Shovel Turnings	30.00-31.00
Cast Iron Borings	29.00-30.00
Bar Crops and Plate	38.00-39.00
Low Phos. Cast Steel	38.00-39.00
Punchings & Plate Scrap	38.00-39.00
Elec. Furnace Bundles	36.00-36.50
Heavy Turnings	34.00-34.50
Alloy Free Turnings	34.00-34.50
Cut Structurals	38.00-38.50
No. 1 Chemical Borings	33.50-36.50

Cast Iron Grades

No. 1 Cupola	42.00-43.00
Charging Box Cast	38.00-38.50
Heavy Breakable Cast	35.50-36.50
Stove Plate	42.00-43.00
Unstripped Motor Blocks	40.50-41.50
Malleable	45.00-46.00
Brake Shoes	31.00-34.50
Clean Auto Cast	46.00-48.00
No. 1 Wheels	40.00-41.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00
R.R. Malleable	45.00-46.00
Axles	41.00-42.00
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	35.50-38.00
Rails, 3 ft and under	37.50-41.50
Rails, 18 in. and under	38.75-43.00
Railroad Specialties	38.50-42.50
Uncut Tires	38.50-40.50
Angles, Splice Bars	37.00-42.00

* Prices for steelmaking grades from remote points range up to $40, including $7 to $8 freight.

CLEVELAND:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt Steel	32.50
No. 1 Busheling	32.50
Nos. 1 & 2 Bundles	32.50
Machine Shop Turnings	27.50
Mixed Borings, Turnings	27.50
Short Shovel Turnings	28.00
Cast Iron Borings	25.50-26.50
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings & Plate Scrap	35.00
Elec. Furnace Bundles	33.50
Heavy Turnings	30.00
Alloy Free Turnings	28.50
Cut Structurals	35.00
No. 1 Chemical Borings	29.50

Cast Iron Grades

No. 1 Cupola	46.00
Charging Box Cast	42.00
Heavy Breakable Cast	44.00-46.00
Stove Plate	40.00
Unstripped Motor Blocks	42.00
Malleable	44.00-46.00
Brake Shoes	35.00
Clean Auto Cast	45.00
No. 1 Wheels	38.00
Burnt Cast	34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50
R. R. Malleable	45.00
Rails, Rerolling	35.00-36.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	39.00
Railroad Specialties	30.50
Uncut Tires	36.50
Angles, Splice Bars	28.50

VALLEY:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Bundles	35.00
Machine Shop Turnings	29.00
Short Shovel Turnings	30.00
Cast Iron Borings	29.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00

MANSFIELD:

No. 1 Heavy Melt. Steel	$35.00
Machine Shop Turnings	30.00
Short Shovel Turnings	32.00

CINCINNATI:

No. 1 Heavy Melt. Steel	$34.00-35.00
No. 2 Heavy Melt. Steel	34.00-35.00
No. 1 Busheling	34.00-35.00
No. 1 Bundles	34.00-35.00
No. 2 Bundles	34.00-35.00
Machine Shop Turnings	25.00
Mixed Borings, Turnings	23.00
Short Shovel Turnings	26.00
Cast Iron Borings	26.00

Cast Iron Grades

No. 1 Cupola Cast	42.00
Charging Box Cast	35.00
Heavy Breakable Cast	37.00
Stove Plate	32.00
Unstripped Motor Blocks	32.00
Brake Shoes	28.00
Clean Auto Cast	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	34.00-35.00
R.R. Malleable	45.00
Rails, Rerolling	40.00
Rails, Random Lengths	40.00
Rails, 18 in. and under	45.00

DETROIT:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.00-34.50
No. 1 Busheling	34.00-34.50
Nos. 1 & 2 Bundles	34.00-34.50
No. 3 Bundles	34.00-34.50
Machine Shop Turnings	26.00-26.50
Mixed Borings, Turnings	26.00-26.50
Short Shovel Turnings	27.00-27.50
Cast Iron Borings	27.00-27.50
Punchings & Plate Scrap	37.00-38.00

Cast Iron Grades

No. 1 Cupola Cast	$39.00-41.00
Heavy Breakable Cast	32.00-34.00
Clean Auto Cast	39.00-41.00

BUFFALO:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1 & 2 Bundles	35.00
No. 3 Bundles	30.00-31.00
Machine Shop Turnings	28.00-29.00
Mixed Borings, Turnings	28.00-29.00
Short Shovel Turnings	30.00-31.00
Cast Iron Borings	27.00-28.00
Punchings & Plate Scrap	36.00-38.00
Elec. Furnace Bundles	35.50-36.50
Alloy Free Turnings	33.00-34.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-42.00
Charging Box Cast	36.50-38.50
Stove Plate	38.00-40.00
Malleable	40.00-42.00
Clean Auto Cast	38.00-42.00
No. 1 Wheels	38.00-40.00

PHILADELPHIA:

No. 1 Heavy Melt. Steel	$38.50-40.00
No. 2 Heavy Melt. Steel	38.50-40.00
No. 1 Busheling	38.50-40.00
No. 1 & No. 2 Bundles	38.50-40.00
No. 3 Bundles	35.50-36.00
Machine Shop Turnings	29.00-30.00
Mixed Borings, Turnings	28.00-29.00
Short Shovel Turnings	29.00-30.00
Cast Iron Borings	29.00-30.00
Bar Crops and Plate	41.50-43.00
Cast Steel	41.50-43.00
Punchings & Plate Scrap	41.50-43.00
Elec. Furnace Bundles	40.00-41.00
Heavy Turnings	37.50-39.00
Cut Structurals	40.00-41.00
No. 1 Chemical Borings	36.50-37.00

Cast Iron Grades

No. 1 Cupola Cast	50.00
Charging Box Cast	46.00-47.00
Heavy Breakable Cast	46.00-47.00
Unstripped Motor Blocks	44.00-44.50
Malleable	50.00-51.00
Clean Auto Cast	47.50-48.00
No. 1 Wheels	47.50-48.00

NEW YORK:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$35.75
No. 2 Heavy Melt. Steel	35.75
No. 1 Busheling	35.75
Nos. 1 & 2 Bundles	35.75
No. 3 Bundles	33.75
Machine Shop Turnings	26.00
Mixed Borings, Turnings	26.00
Short Shovel Turnings	28.00
Punchings & Plate Scrap	37.00
Elec. Furnace Bundles	36.00-37.00
Cut Structurals	37.00
No. 1 Chemical Borings	28.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-43.00
Charging Box Cast	41.00-42.00
Unstripped Motor Blocks	40.00
Malleable	43.00-44.00

BOSTON:

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.00-32.00
No. 2 Heavy Melt. Steel	31.00-32.00
No. 1 Busheling	31.00-32.00
Nos. 1 & 2 Bundles	31.00-32.00
Machine Shop Turnings	25.00-26.00
Mixed Borings, Turnings	24.00-25.00
Short Shovel Turnings	27.00-28.00
Bar Crops and Plate	33.00-34.00
Punchings & Plate Scrap	32.50-33.50
No. 1 Chemical Borings	25.00-26.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-45.00
Charging Box Cast	40.00-41.00
Heavy Breakable Cast	42.00-44.00
Stove Plate	39.00-40.00
Clean Auto Cast	44.00-46.00

CHICAGO:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt. Steel	32.50
Nos. 1 & 3 Bundles	32.50
No. 3 Bundles	30.50
Machine Shop Turnings	27.00-28.00
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings	28.00-29.00
Cast Iron Borings	28.00-29.00
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings	35.00
Elec. Furnace Bundles	33.50
Heavy Turnings	32.00
Cut Structurals	35.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	35.00-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.50
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	37.00-38.00
Rails, 3 ft. and under	40.00-41.00
Rails, 18 in. and under	41.00-42.00
Railroad Specialties	37.00-39.00
Angles, Splice Bars	36.00-38.00

ST. LOUIS:

No. 1 Heavy Melt. Steel	$32.25-33.00
No. 2 Heavy Melt. Steel	32.25-33.00
Machine Shop Turnings	27.25-27.75
Short Shovel Turnings	29.25-29.75

Cast Iron Grades
(Fob shipping point)

No. 1 Cupola Cast	35.00-37.00
Charging Box Cast	30.00-35.00
Heavy Breakable Cast	30.00-32.00
Stove Plate	29.00-34.00
Brake Shoes	28.75-31.00
Clean Auto Cast	35.00-37.00
No. 1 Wheels	34.50-36.50
Burnt Cast	25.00-30.00

Railroad Scrap

R.R. Malleable	41.00-42.00
Rails, Rerolling	40.00-42.00
Rails, Random Lengths	37.00-40.00
Rails, 3 ft. and under	40.00-43.00
Uncut Tires	34.50-36.50
Angles, Splice Bars	37.00-38.00

BIRMINGHAM:

No. 1 Heavy Melt. Steel	$32.50-33.00
No. 2 Heavy Melt. Steel	32.50-33.00
No. 1 Busheling	32.50-33.00
Nos. 1 & 2 Bundles	32.50-33.00
Long Turnings	23.00-23.50
Short Shovel Turnings	27.50-28.00
Cast Iron Borings	22.00-22.50
Bar Crops and Plate	34.00-34.50
Punchings & Plate Scrap	34.00-34.50
Cut Structurals	34.00-34.50

Cast Iron Grades

No. 1 Cupola Cast	39.00-40.00
Stove Plate	35.00-36.00
No. 1 Wheels	38.00-39.00

Railroad Scrap

No. 1 R.R. Heavy Melt	29.50-30.00
R.R. Malleable	37.50-38.00
Axles, Steel	35.50-36.00
Rails, Rerolling	41.00-42.00
Rails, Random Length	33.00-34.00
Rails, 3 ft. and under	36.00-37.00
Angles and Splice Bars	37.00-38.00

SAN FRANCISCO:

No. 1 Heavy Melt. Steel	*$19.04
No. 2 Heavy Melt. Steel	*19.04
No. 1 Busheling	*19.04
Nos. 1 & 2 Bundles	*19.04
No 3 Bundles	*17.04
Machine Shop Turnings	*12.54
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths	21.00
Uncut Tires	28.00

* Fob California shipping point.

SEATTLE:

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Busheling	20.00
Nos. 1 & 2 Bundles	20.00
No. 3 Bundles	18.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R. R. Heavy Melt	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES:

No. 1 Heavy Melt. Steel	$16.50
No. 2 Heavy Melt Steel	15.50
Nos. 1 & 2 Bundles	14.50
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00

Cast Iron Grades

No. 1 Cupola Cast	30.00

Sheets, Strip . . .

Pressure for strip eases slightly as consumer buying resistance stiffens

Sheet & Strip Prices, Page 138

Boston—Buyers' resistance is developing in one modest industry—the manufacture of baby carriages— portending an influence on hot strip demand in second quarter in way of deferments, a factor which may affect the third. This resistance originates at retail-consumer points, but is filtering down to carriage assembly plants with curtailments in production schedules; consequently, pressure for strip is easier. Baby carriages take an average of 30 pounds of steel; narrow strip is the leading item, balance being small bars, springs, tubing and miscellaneous products. In other directions, pressure for narrow cold strip is unabated with backing and filling over price stabilization and uniformity confounding buyers. This, up to now at least, includes carbon range variations, application of extras, edge finish and minor charges—even base prices for Worcester. Need for sheets, light gages especially, is as great as ever, notably with producers of stamped products. Fabricators of flat-rolled are some times billing two prices for parts, preliminary quotation at time of shipment and supplemental price after cost accounting, indicating uncertainty on costs, including steel. While involving relatively limited tonnage, enough premium price flat-rolled is appearing, even in light gages, to add confusion to the price situation.

New York—Sheet sellers are adjusting their second quarter quotas so as to provide adequate tonnage for the housing program. Various sellers had set up quotas originally without too much regard for second quarter needs for this work because they were not sure as to what the general policy of the government might be. However, when the steel producers agreed to voluntarily meet essential requirements and the government therefore agreed to withdraw mandatory control, at least for the most part, a number of mills found it necessary to step up their quotas, and are doing so where they are convinced that the steel is to be moved definitely into essential housing work. They are taking special pains to prevent diversion of portions of the tonnage into other channels and especially into the black market.

Pittsburgh — No letup in heavy pressure for prompt mill shipment of sheets and strip is in sight. Production has been well sustained to date this year and overall output is scheduled to be augmented considerably as additional production facilities are placed in operation. However, sellers see no easing in demand in immediate months ahead, for output is falling far short of present needs. Distribution of steel products for the federal housing program next quarter will match first-quarter shipments by product on a tonnage basis, but will not necessarily follow similar distribution patterns among various consumers.

Chicago—Scarcity of steel sheets is working hardships on many metal fabricating plants, and curtailed operations are becoming more numerous. Some are trying to find means to go from 5-day to 4-day work weeks, but in doing so are faced with threats of unions that they will demand pay for five days. Some

sink manufacturers complain that they are unable to merchandise their products without cabinet bases, and these being unobtainable are retarding production of sinks. Some mills, finding car shortages restricting shipments of sheets, are urging their customers to obtain trucking options for such material which can be so delivered.

Birmingham — With cold-rolled sheet facilities under way in the district, considerable alleviation of an admittedly inadequate sheet supply is in the offing, although indications are that demand will continue to exceed supply. It is doubtful if any product of the district is in greater continuous demand than sheets, both for processing and roofing. As a mater of fact, lack of adequate sheet tonnage has materially hampered moderate industrial expansion in this section.

St. Louis — Despite strenuous efforts, sheet mills have been unable to pick up ground on rolling schedules and remain up to ten months behind on deliveries. May schedules are being rolled now. Books for 1947 remain closed and probably will not open until the backlog has been cut substantially. A new cold rolling mill due for completion next May will raise output of light gage sheets from the present 7000 tons monthly to 18,000.

Plates . . .

Plate Prices, Page 139

New York — Plate producers are readjusting their schedules for second quarter so as to meet requirements of the railroads and car builders for the construction of 7000 domestic freight cars per month, plus a certain amount of equipment repairs, and while 10,000 cars have been discussed it appears that they will not be called upon to supply any more for this work for at least the greater portion of the second quarter. Steel producers want car builders to get production up to 7000 cars first before definitely committing themselves to supply more steel. Some plate producers believe that the equipment shops will not, in fact, be able to reach 7000 before at least the second quarter. Meanwhile, the mills are booked up solidly for the second quarter, or as much longer as they care to promise delivery. At least one mill is practically out of the market for the remainder of the year, despite various cancellations that have been made recently in an effort to bring their order books in better balance with rolling schedules.

Boston — Allocation of steel for the freight carbuilding program can be spread over more mills for upper-structure requirements than is the case for substructure steel; two mills in the East must carry the load for wheels, axles and other foundation stock. For side, end and roof steel, plate mills are revising quotas to meet additional demands and plate fabricating shops can look for no increase in tonnage in the near future. As a matter of fact, the outlook is for less, notably in lighter gages. This hurts small tank fabricators and most miscellaneous industrial users.

Birmingham — Demand for plates in the South still places greatest emphasis on lighter gages with scant probability that mills will catch up on demand this year. Even so, a consistently large tonnage of heavy plates is moving to Gulf port shipbuilding and repair plants, and into structurals, although most of

the pressure comes from tank manufacturers and the district's freight car builder.

Revised Extra List Issued By Carnegie on Plates

Revised extra card on hot-rolled carbon steel plates and floor plates has been issued by Carnegie-Illinois Steel Corp. The new card, dated Feb. 17, supersedes the list issued Jan. 3.

In the revised pamphlet the term "plain plates" is designated as including 0.180 in. or thicker, over 48 in. wide; 0.230 in. or thicker, over 6 in. wide; 7.35 lb per sq ft or heavier, over 48 in. wide; 9.62 lb per sq ft or heavier, over 6 in. wide.

Steel Bars . . .

Supply of bars 1½-inches and larger improves . . . Smaller sizes remain scarce

Bar Prices, Page 138

Boston—Although unbalanced inventories are causing some shipment deferments, up to 90 days on a few steel products, relatively small carbon bar tonnage is affected and then only in larger sizes of hot and cold-rolled. Mill schedules are crammed with small sizes but signs indicate an easing in heavier rounds, flats and squares which will gradually reach the lighter ranges through next quarter. In sizes making up the bulk of demand, prospects for larger tonnage to consumers over the next three months are slim, although in spots quotas are slightly higher. Supplies of alloys, stainless, most tool steels and some specialties are in balance with demand.

New York—Some of the larger cold drawers of carbon bars, who until recently had been selling on a quarterly quota basis, are now not only booking orders for third quarter, where the specifications are attractive, but for the fourth quarter as well. This is to meet competition of some of the smaller interests. On hot cabon bars, however, they are still adhering to a quarterly schedule, even though demand for the larger specifications continues to ease, indicating a generally softer outlook by next summer.

Philadelphia — Strong demand for small sizes continues to feature the carbon bar market, with supply far short of requirements. However, there is an appreciable easing in demand for the large specifications, and in time this should result in improved supply of small sized bars. Most trade interests, however, doubt if there will be any material betterment in the latter carbon ranges before summer. Meanwhile, delivery promises on alloy bars continue easy.

Pittsburgh—Bar mill production schedules have been adversely affected recently by critical shortage of industrial gas. Some easing in demand for large rounds is developing with sellers now offering fairly reasonable delivery promises. However, there is no indication of any let-up in pressure for early shipment promises in the smaller size ranges. Cold-finishers have made little headway against order backlogs in recent weeks due to frequent interruptions to production schedules. Demand for cold-drawn bars has recorded little change.

Tin Plate . . .

Tin Plate Prices, Page 139

Pittsburgh—World tin production this year is expected to fall far short of that consumed even at present levels as limited under orders M-43 and M-81. On basis of this estimate, it is predicted that the government's reserve stock of tin, exclusive of that held for emergency stockpiling, will be nearly exhausted by close of this year. Production of tin mill products remains at practical capacity, although continued box car shortage is a threatening factor to present high operating rate. Overall tin plate supply likely will remain tight throughout 1947, despite an increase in production facilities scheduled for later this year.

Washington—Office of International Trade now permits exportation of metal beverage crowns made of tin plate, effective as of Feb. 24.

New York — American Can Co. announced last week that it will deliver metal containers at a rate of 85 per cent of the base selected by each customer under the 1947 allocation plan it outlined to the trade in January. Two of the usage bases call for 80 per cent of the area of tin plate, black plate and terne plate in metal containers listed in a customer's present contract schedule, which were shipped to him in 1945 or 1946. Two call for 100 per cent of the plate usage, as outlined, in either 1940 or 1941. Four other bases, affecting users, limited or excluded in their use of cans by government restriction, whose business had increased sharply during the war and who previously had packed in metal containers, call for 80 per cent of either 1940 or 1941 usage adjusted to reflect growth in business as shown in 1945 or 1946.

Wire . . .

Wire Prices, Page 139

Chicago — Distributors of merchant wire and wire products are accepting second quarter allocations from producers in full and are pleading for more, since quantities are far short of consumers' requirements. An exception is light field fence. As to manufacturers' grades of wire, exceedingly heavy pressure continues for galvanized. Little of this product has been available this quarter, and prospects for second quarter are no better. With approach of spring, paving projects are coming to the fore, auguring mounting needs for mesh. In all probability, demand will exceed productive capacity the balance of this year. Inquiries for wire rope are more numerous, reflecting heavier operations by equipment manufacturers and fact that recent substantial inventories have been worked down.

Pittsburgh — Output of wire rods and wire products remained sharply curtailed last week, reflecting complete shut down of production facilities at American Steel & Wire Co.'s Donora plant due to shortage of industrial gas. Other wire mill production facilities were adversely affected to a lesser extent. Consumer pressure for deliveries of all wire products remains very heavy, and according to most producers will not be alleviated this year.

Tubular Goods . . .

Tubular Goods Prices, Page 139

Pittsburgh — Order backlogs on tube mills range between 3 and 4 months on alloy and stainless, 6 months on carbon. Reflecting extended mill delivery promises for standard pipe (into 1949 in some instances), tubing manufacturers report a number of requests to produce standard lighter weight pipe on tube mills with customers willing to pay premium up to $50 a ton. Extent of the heavy pressure for oil country goods is indicated by the forecast that nearly 1000 more domestic wells will be drilled this year than in 1946. Export requirements also are steadily expanding, with producers able to supply but a fraction of overall needs.

Seattle—Cast iron pipe continues in strong position, demand being active in spite of slow deliveries. New contracts are being accepted subject to deferred shipment, 12 months or more forward. Several major jobs are pending.

Structural Shapes . . .

Structural Shape Prices, Page 139

New York — Structural buying is heavier, and includes two 5600-ton veterans' hospitals and two 2000-ton boiler stations. A veterans' hospital in Brooklyn, involving 6600 tons, will be up for rebidding Mar. 17. Recent inquiries have been rather light, although there are a number of projects pending, including a 20-story loft at 40th St. and 8th

Ave., and a privately financed housing project in Grand St., on the east side of Manhattan. There is still hesitancy because of increasing costs for labor and materials, but once these costs become stabilized it is expected that many projects will be placed even though the average cost should be much higher than before the war, or even somewhat higher than it is now.

Boston—Indications are the slight increase in plain structural tonnage to fabricators, and some warehouses by one producer will be short-lived. Freight car demand, starting next quarter will be heavier and should mount steadily during the second half. Mills are still hampered with carry-overs and April shipments to warehouses will probably be lower. Most telephone exchange construction planned for this year is going ahead. Contracts are also being placed for several power plant projects in Maine. Considerable tonnage of structural steel is going into pulp and paper mill rehabilitation.

Chicago—Activity in fabricated structural steel holds at very low level, both award and inquiry-wise. Unable to obtain an adequate supply of plain material from mills, fabricators are running behind in shop schedules and with allocated tonnage earmarked against commitments already in hand, they display interest in only the most attractive of new projects. It does not appear likely that present level of business can be increased much for months to come. Largest job current here is 2000 tons for a new die casting plant in Hillside, Ill.; bids were taken Feb. 20 and award is expected within a few days.

Seattle — Operations of fabricating plants are hampered by inadequate inventories, coupled with a flow of plain materials from the mills at a rate that is below current needs. Some delayed shipments are arriving but a normal flow of materials is not expected until third quarter. Preference is given to small jobs in view of the supply situation.

Washington state has placed 100 tons for a bridge at Morton with Isaacson Iron Works, Seattle. Bidders have been asked to figure on about 2500 tons for an Army barracks at Ladd Field, Alaska, and other major tonnages are pending.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 138

Chicago — Pending jobs involving reinforcing steel in excess of 100 tons have narrowed down to a mere handful and new inquiry is almost negligible. Some on which bids were taken weeks ago have not as yet been awarded because of steel shortage. Projects requiring only a few tons, however, are comparatively numerous and on these distributors are centering their attention. Paving jobs are becoming more numerous with the approach of spring and this activity is expected to expand considerably in the weeks ahead, with resultant strong demand for mesh. It is likely that total requirements will exceed production capacity for remainder of the year.

Seattle—Rolling mills are operating steadily but backlogs are not being appreciably reduced, new business being about equal to output. A heavy volume of small orders is being booked, preference given to regular customers and public works. Several projects involving reinforcing bars are to be placed soon.

Pig Iron . . .

$2.50 to $4 price advance narrows disparity between scrap and pig iron prices

Pig Iron Prices, Page 140

Pittsburgh—Commercial aspect of the wide disparity between scrap and pig iron prices is believed the major reason behind the $2.50 to $4 per ton advance recently announced by most merchant pig iron producers. Increased iron ore and coke costs were important factors for latest price action, but fact that some cast scrap grades were selling at more than $10 per ton above pig iron in contrast to the normal price relationship of slightly below iron, was believed chief reason for advancing pig iron prices.

The Neville Island, Pa., merchant producers advanced prices on all grades $3 per gross ton effective on shipments Mar. 1; while similar increases were put into effect by producers in Youngstown area. The new prices fob cars Neville Island, Pa., are: Basic, $33 per ton; No. 2 foundry and malleable, $33.50; and bessemer, $34.

Philadelphia — The Swedeland, Pa., pig iron producer has advanced prices on No. 2 foundry, bessemer and malleable $4 a ton, and is applying a temporary increase on basic, based on the replacement value of scrap required for the company's open hearth consumption at Conshohocken, Pa. As this base price is subject to fluctation, STEEL is drop-

ping the Swedeland basic price from its table for the time being. Meanwhile, the minimum delivered Philadelphia price on basic is being based at the 1.72c rate from Bethlehem. As a matter of fact, the Birdsboro, Pa., furnace is nearer Philadelphia than the Bethlehem producer, the rate being 1.52c. However, some time ago the Birdsboro producer advanced his prices $3 a ton, whereas the Bethlehem producer has made no change. Pending possible changes at other producing points, the delivered Philadelphia price on northern foundry is $32.22; basic, $32.72; malleable, $33.72. The Swedeland base prices on foundry, bessemer, and malleable are $35.50, $36.50, and $36, respectively.

With apparently only soil pipe foundries scheduled to receive rated tonnage for the housing program during the second quarter, priorities will be dropped in this district on tonnage estimated to be two times as heavy as that scheduled for soil pipe producers. However, this does not mean that consumers adversely affected by this priority regulation will be cut off entirely. In fact, some sellers believe that they will be able to supply them with a fair amount of tonnage throughout the entire quarter.

Boston — New England consumers are still paying the lowest prices for foundry pig iron, recent advances affecting little tonnage melted in this area. Basic consumers are not so fortunate; their iron costs are up in line with increases since decontrol plus higher freights on fob mill basis. Price supply is also critically small with most users. The price of gray iron and malleable castings has advanced sharply in many cases; this has resulted in cancellation of a few subcontracts, in one instance where gray iron castings went to 45.00c a pound. The prime contractor cancelling, however, is uncertain as to an increase in his own iron supply to make up the difference. Shipments of outside iron are at a low ebb, bulk of foundry iron being supplied by Mystic with some shops rather low on malleable. While there are no foundries actually down for lack of iron, melt is substantially below what it would be if more tonnage were available.

Buffalo — With the winter's worst snowstorm disrupting railroad service, the shortage of cars which has been plaguing merchant iron producers reached a climax last week. All shipments were halted by the leading merchant iron producer in the area. Foundries reported operations threatened and curtailed as this top producer piled more than two days' output. With snow interfering with switching operations, producers were forced to bank furnaces at various times during the week. This makes the second successive week that storms have raised havoc with operations and considerable tonnage has been lost.

Cincinnati—Shipments of pig iron are steady but far below needs of district melters. Isolated cases may be uncovered where large premiums were offered in attempts to get more iron, from other than regular sources of supply. Allotments of furnaces to regular customers are holding close to previous levels.

Cleveland — Interlake Iron Corp. advanced pig iron prices, effective Mar. 1, $2.50 a ton on No. 2 foundry and basic and $3 a ton on bessemer and malleable, except at Erie, Pa., where the base prices were advanced $2.50. Base prices at Erie, Chicago and Toledo, O., are now quoted $33 for No. 2 foundry, $32.50 for basic, $34 for bessemer, and $33.50 for malleable. Base prices at Duluth are 50 cents per gross ton higher.

The Republic Steel Corp. advanced prices last week to the following levels, fob furnace at Cleveland, Canton and Massillon: No. 2 foundry, $33; basic, $32.50; malleable, $33.50. Low phosphorus is now quoted $39, Troy, N. Y.

Birmingham — Sloss-Sheffield Steel & Iron Co. increased its pig iron by $3 a ton, effective Mar. 8. The market is now quoted as follows: No. 2 foundry, $29.88; basic, $29.38; bessemer, $34.50. Movement of northern iron into the district also is scheduled, along with iron from Texas. Some sources say estimates of the need for an additional 50,000 tons monthly in this territory is not adequate. Production, however, is at virtual capacity.

Chicago — Pig iron prices in this district were advanced Mar. 1 $2.50 a ton for foundry and basic grades, and $3.00 for bessemer and malleable grades, the increases being established by virtually all interests. So far, no action has been taken on southern iron, delivered Chicago, but some action is expected within the week. Meanwhile, foundries are begging for increased supplies of iron and are optimistic about more generous treatment now that official allocation is being abandoned. There is widespread feeling that more iron has been allocated to the housing program than consumption for the purpose required.

Washington—Civilian Production Administration has eliminated, effective Apr. 1, all priority ratings except limited use in support veterans housing program, and for veterans' hospital program. Ratings issued for other purposes will expire on that date, except where being used to obtain specified construction items. A new rating symbol "RR" is established, and specified current ratings such as old "AAA" "MM" or "CC" may be converted to the new rating, when used for getting items needed to maintain or increase production of building material or products listed in the new regulation. Thus, ratings can be applied for production material and capital equipment; for bathtubs; cast iron soil pipe and fittings and for some other items, such as low pressure boilers. Production materials can be obtained on rating, but capital equipment is limited to replacement only; the same applies to builders' hardware, insect screen cloth, convector and cast iron radiation, registers and grills, etc. Valid "AAA" "MM" and "CC" ratings are not effective for purchase of steel for delivery after Mar. 31. Except for specified construction items these ratings will expire Mar. 31.

Lifting of directives for the housing program is expected to result in more equitable distribution of the limited pig iron available for other important production programs such as freight car construction, automotive and farm equipment. There will not be sufficient merchant pig iron tonnage available this year to meet overall needs. This tight supply situation has been accentuated by practice of steel producers using a substantially larger proportion of hot metal in their operations due to wide disparity between pig iron and scrap prices.

January production of cast iron soil pipe was 54,600 tons, an all-time high which exceeded for the first time the 50,000-ton monthly production goal set for the industry, CPA said last week. This compares with production of 28,000 tons in January, 1946, and the previous high monthly average of about 47,000 tons in 1941.

St. Louis — Pig iron producers are awaiting developments from abolition of the allocation system to the housing field except soil pipe. Not more than 20 per cent of this district's output remains under control for housing, so ironmakers anticipate considerable pressure from starved melters for the unfrozen tonnage. The normal quarterly buying system has been discarded and the industry is handling orders on a month-to-month or week-to-week basis.

Rails, Cars . . .

Track Material Prices, Page 139

New York—While steel producers have indicated their willingness to supply steel eventually for a program of 10,000 domestic freight cars per month, they have not as yet committed themselves definitely. They would rather wait until production reaches its present goal of 7000 cars per month and then see what can be done at that time toward stepping the program up to the higher goal. They point out that domestic freight car production for the past three or four months has run less than 3000 cars on an average. They believe that it may take a fair amount of time for car builders to get production up to 7000 cars, along with necessary repair work.

Scrap . . .

Upward price trend supported by deals under which fabricators supply scrap

Scrap Prices, Page 144

Philadelphia — Scrap prices generally have undergone another sweeping advance, a trend that will be checked in the near future, some leading trade interests believe, by more open weather conditions and a serious attempt on the part of both producers and sellers to eliminate trade-in transactions and excessive cross-hauling. Meanwhile, inventories are low at consuming plants and in dealers' yards. The market here is quoted as follows: No. 1 and No. 2 heavy melting, No. 1 busheling and No. 1 and No. 2 bundles, $38.50 to $40; No. 3 bundles, $35.50 to $36; machine shop turnings, $29 to $30; mixed borings and turnings, $28.00 to $29; short shovel turnings and cast iron borings, $29 to $30, bar crops and plate, cast steel, punchings and plate scrap, $41.50 to $43; electric furnace bundles, $40 to $41; heavy turnings, $37.50 to $39; cut structurals, $40 to $41; No. 1 chemical borings, $36.50 to $37; and No. 1 cupola cast, $50; charging box cast and heavy breakable cast, $46 to $47; unstripped motor blocks, $44 to $44.50; malleable $50 to $51; clean auto cast, $47.50 to $48; and No. 1 wheels, $47.50 to $48.

New York—Heavy pressure for scrap continues, with New York brokers' buy-

ing prices substantially higher. No. 1 and No. 2 heavy melting steel and No. 1 busheling and No. 1 and No. 2 bundles are now holding at $35.75, fob shipping point. Other grades are quoted as follows: No. 3 bundles, $33.75; machine shop turnings and mixed borings and turnings, $26; short shovel turnings, $28; punchings and plate scrap, $37; electric furnace bundles, $36 to $37; cut structurals, $37; No. 1 chemical borings, $28; No. 1 cupola cast, $42 to $43; charging box cast, $41 to $42; unstripped motor blocks, $40; malleable, $43 to $44.

Along with much speculation as to the future of the market, there is question as to the effect of a possible coal miners' strike. While there is variance of opinion, it is pointed out that major coal strikes of recent years have actually resulted a rise in the scrap price.

Pittsburgh — Despite adverse weather the collection and segregation of scrap are substantially improved. Mills have 3 to 4 weeks' supply on hand, despite practical capacity operations since first of this year. Considerable scrap is moving into this district from remote points under direct consumer-mill reciprocity basis, and reportedly below the quoted prices at those points. Local scrap quotations recorded little change last week, with market for heavy melting steel holding firm at $35 per ton for scrap originating in this district.

Chicago—Carnegie-Illinois Steel Corp. officials here denied the report attributed to them that a new price for steel scrap to be paid by that company would be announced.

Boston — Higher prices for steelmaking scrap, most grades having followed the $1 advance in heavy melting, are not bringing out more tonnage. Bulk of shipments are to Pennsylvania mills. Inventories with district consumers are low. While extreme high prices for cast are less in evidence, the market has not weakened to any extent with $45 paid for No. 1 cupola, with other grades holding at recent tops. Most melters would increase ratio of pig iron in melts if possible at current scrap prices, but available tonnage is still limited and spread thin; on cast prices especially the limited pig iron supply is a major factor in supporting high quotations.

Buffalo—Snow-clogged yards reduced scrap deliveries last week to a mere trickle and consumers again are concerned over supplies. Storms also forced mills to reduce open hearth operations but this action has had little effect on scrap consumption because blast furnaces have been banked too, cutting off iron for steelmaking. Dealers report the storm interrupted an improved flow of scrap which followed recent price increases. Huge snow drifts in yards are hampering processing operations. Spirited bidding is reported between local dealers and Valley and Pennsylvania purchasers for offerings in the north and middle sections of the state. While this material usually moves into this section, local dealers report outside bidding which boosts No. 2 heavy melting to as high as $38 a ton after the buyer absorbs freight charges. Dealers here are sticking to a $35 top.

Cleveland—Mills in this district have held aloof of the scrap market due to the high asking prices. Large tonnages are moving out of this district, however, at rapidly fluctuating prices. Many of the leading interests look for a sharp price reaction, possibly later this month or early next month. Heavy melting is still quoted $32.50 while short shoveling turnings are $28. Foundries are paying from $35 to $40 a ton for cut structurals, bar crops and plate, but most of this material originates at remote points.

Detroit—Unrelenting pressure from outside buyers has forced prices sharply upward here, steel grades being quoted $34.00-$34.50, up $4 a ton, while borings and short shoveling turnings are up $2.50 per ton to $27.00-$27.50. Electric furnace scrap likewise has moved to higher ground at $37.00-$38.00. Dealers and brokers covering old orders are forced to pay the higher prices and supply material at prices prevailing when buys were made. Local mills are not doing any new buying as yet. One factor behind accelerating scrap prices is a new "arrangement" worked out by certain electric furnace melters. They furnish ingots for rolling by other mills with available rolling capacity on a cost-plus basis; that is, cost of the scrap required for the ingots plus a reported $30 to $32 conversion charge. This would make steel ingot about $70 per ton at the finishing mill. Cost of the resulting rolled products can be imagined, but fabricators pressed for steel are paying the charge. In one setup here, a local fabricator is supplying the scrap for an electric furnace melter to convert to ingots, supplying them in turn to a Chicago mill for further conversion to sheet and strip which is sold back to the original fabricator. In this hookup, the price of the scrap involved is not

o important, since the steel all comes ack to the source of the scrap.

Although official announcements are cking, indications point to an increase f $3 to $3.50 a ton on open-hearth rap grades to a scrap of $36. This llows several chaotic days in which cal mills sought to stave off loss of aterial to outside districts which were illing to pay premiums amounting to 3 or more above quoted levels. With rap in short supply and steelmaking perations at 93 per cent, highest since ecember, 1945, mills can ill afford ncroachment which would endanger roduction.

Cincinnati—Scrap market is strong, pecially in rails and cast. No. 1 heavy elting steel, quoted at $35, has at-acted a higher price in some instances. elters are fairly well supplied but all e eager for more tonnage, even though attempt at price resistance is en-untered frequently. Tie-in deals are abated. Scrap shipments were slowed the last ten days because of adverse eather conditions or shortage of freight rs, or both.

Birmingham — Scrap is the most un-edictable item within the South's in-ustrial picture. Evasion is a regular rocedure in price quotations, but the arket, nevertheless, is admittedly out control. As an indication, heavy melt-g has jumped to $32.50 to $33 with upward tendency of the same propor-ons all down the line during the week. upplies in wanted items are still short. eather conditions have contributed bstantially to that situation.

St. Louis — Scrap market continues a state of indecision. There has been change in published prices but nu-erous premium sales are reported. Ship-ents remain level following a note-orthy increase two or three weeks ago.

Seattle—Supply of steel scrap has im-oved and, while mills are using receipts mediately, it is hoped that heavier ipments will enable accumulation of ventories during the summer. Better eather and higher prices have stimu-ted shipments from the country and ll buyers believe the crisis is passed d that there will be no interruption operations. The prevailing price for avy melting. No. 1 and No. 2 bundles d No. 1 busheling here is $20 per oss ton for Seattle delivery, $19 at mote points, representing a $1 increase er the schedule announced in January.

Warehouse . . .

Warehouse Prices, Page 141

Pittsburgh — Mill shipments to dis-butors recorded little change last nth on a daily average basis com-red with January. In most instances a ther reduction in warehouse steel cks occurred, despite strict allocation dwindling inventories. At least one tributor reports stocks are lowest on ord, particularly in flat rolled prod-s, although the supply outlook is more mising. So far distributors' experi-e in revising speculations to avoid ckaging, quantities and dead length ras has worked out satisfactorily. One rehouse interest, now ordering bars 10 per cent random lengths, reports percentage of odd sizes shipped by ls to date has averaged well below limit; and as long as present tight pply situation prevails this interest does not anticipate much difficulty in getting rid of the odd sizes.

Cleveland — Little or no improvement is reported by jobbers in this area, one warehouseman declaring the situation is the worst in his 45 years' experience. Sheets, plates and structurals remain in critically short supply, inventories becoming increasingly out of balance. At least one mill is refusing warehouse orders in an attempt to work off its backlog to warehouses, and hopes this arrearage may be made up by late April or May. Warehouse customers, in not a few instances, are buying their steel on the so-called "black market" in an attempt to get enough to keep their plants operating, even on reduced schedules. Warehousemen frankly admit inability to come anywhere close to satisfying customers' demands with result that when offerings of steel are made, even at the fantastic prices quoted of upwards of 12c a lb, they are often grabbed up. One sale, involving some 30 tons, was reportedly made at 11c a lb, the buyer claiming that receipt of this steel was all that was keeping his plant in operation. Revision of extras has affected to some extent warehouse buying habits, particularly with regard to length specifications. Random lengths are accepted from mills with little difficulty encountered in disposing of shorts.

Philadelphia—For the first time since steel prices started undergoing revision some weeks ago, a leading jobber here is issuing a printed price list, this being

on the assumption that mill prices h become stabilized for at least the ti being. It is interesting to note that t interest is quoting special quality extras on rounds and squares, 3 inc and over. Warehouse demand in gene continues heavy, with sales being limi by volume of incoming shipments fr the mills.

Boston—Warehouse steel prices v slightly for the same products due to ferences in interpreting extras, nota carbon bars and narrow cold-rolled st A few are absorbing part of the increa costs. Stocks are insufficient to meet mand for flat-rolled and lighter sizes heavier products, a situation not lik to improve next quarter. Some quo conflicting with heavier requireme for car building and sustained needs housing on a voluntary basis, are be reduced.

Seattle—Recent price increases and visions in extras have not decreased mand for warehouse items and the tu over continues unabated. Inventories still abnormally low and jobbers find difficult to increase stocks.

Ferroalloys . . .

Ferroalloy Prices, Page 141

New York — Mounting raw mate and transportation costs have for modest increases in some ferroa prices, Electro Metallurgical Sales Co New York, announced Mar. 6, effec Apr. 1 for contract users and imm ately on a spot basis.

The principal materials affected clude: The silicon alloys from 50 cent through 90 per cent ferrosilicon silicon metal; low carbon ferrochromi in the grades from maximum 0.20 cent through 2.00 per cent carb ferromanganese briquets; silicomangan and silicomanganese briquets; the zirc ium alloys; and calcium-silicon.

The added costs of transporting coming raw materials to points of duction and delivering finished produ to consumers have absorbed a m portion of the last increase in price, company said. Cost of certain ores, sc steel and containers are now as much 2 or 3 times their former cost, and li relief seems in sight from these very h prices.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 139

Cleveland — Bolt and nut produc in this area are caught in an ever-tig ening squeze with shortages of raw terial, particularly wire, coupled with duced operations resulting from curt ment of gas supplies, their big proble Shortage of skilled labor and below n mal productivity of labor contribute their difficulties. Order backlogs c tinue to mount with large inquiries the smaller sized bolts going begg Delivery dates quoted by one produ for ¼-in. alloy bolts stretch as long 18 months. Another maker is offer 18-20 weeks delivery on machine scre Delivery of nuts in the smaller sizes tends six months or more, difficulty obtaining steel being the principal dra back. Fasteners, although a relativ small item in the manufacture of m consumer products, in many cases strict output of these goods to the tent the fasteners are available.

Canada . . .

Toronto, Ont.—Shortage of freight ars has delayed some deliveries of iron nd steel in Canada. A large part of ipments of steel to the big consuming enters, such as Toronto and Montreal, re moved by truck although the rail- oads play an important part in the move- ent to the smaller centers. Heavy snow roughout most sections of Ontario and uebec have had a tendency to slow own trucking activities and many roads ere impassable last week.

Demand for iron and steel continues exceed supply and fresh inquiries are umerous. With the exception of ad- ances in galvanized sheets of 50 nts per 100 lb to $5.05 per net ton nd of 75 cents per 100 lb in extras on lvanized wire and nails, no changes ave been made in Canadian prices since st April. However, it is rumored that rly advances may be excepted in a umber of other steel products, especial- in view of the fact that price ceilings ere lifted on many lines of consumer oods recently, including refrigerators, nges, stoves and furnaces.

While Canadian steel makers are not aking any special play for business, ey are accepting some new orders, and lesmen are on the road mainly for the urpose of making goodwill calls. De- and for steel sheets is much greater an available supply and mills are ooked through the second quarter with e result that producers are not in- rested in additional sheet orders, either lack or galvanized, for the immediate ture. However, the larger consumers re supplied on a quota basis.

Plate demand is steady and delivery gainst new orders extends about two onths into the future. Some large ton- ge plate business is pending in con- ection with the big shipbuilding pro- am to be carried out in Canada this ear for the French government. Roll- g stock builders also are heavy buyers plate and larger tonnages are going agricultural implement makers. It is derstood that the Steel Co. of Canada td. now is handling the bulk of plate pply for the Canadian market and is sured of capacity operations for its late mill throughout the year.

There has been no slackening in de- and for carbon steel bars and while me mills are temporarily out of the arket, reporting books filled to the end June, others are accepting orders for elivery on an "if, as and when" basis. emand is equally brisk for both light d heavy bar sizes. On alloy bars, how- er, producers continue to look for new stomers and some have been making od headway in the export markets.

No easing is reported in supply of ire and nails and present supply falls r short of meeting demand. Black arkets continue to supply many of the naller users of nails and it is reported at numerous building programs have en held up due to nail shortage, es- cially new house construction. It is not pected that there will be much im- ovement in nail production for some me to come as makers continue to re- rt serious shortage of wire rods.

Trading in scrap is almost at a stand- ill in the Canadian markets. This con- tion is entirely due to the scrap short- te and some dealers state their re- ipts have been confined to small lots eraging less than 50 tons per week, for e past several weeks.

High Steel Production Ma Ease Supply in Few Mont

(*Continued from Page* 62)

signed to effect further integration of company's operations and improven of operating practices. It will provide larger diversification of products.

Crucible's program is scheduled completion by the end of 1948. It proj major improvements for five manufac ing plants, in Pittsburgh and Midl Pa., Syracuse, N. Y., and Harrison, N as well as new warehouses in Chic and Philadelphia.

Republic Steel Corp., Cleveland, has a large improvement program u way.

Wickwire Spencer Steel Division, C rado Fuel & Iron Corp., Denver, is mak improvements at its River Road plan Buffalo.

At the American Rolling Mill C plant in Butler, Pa., a $10 million exp sion program is being pushed. This c pany has new construction under wa other works also.

Wheeling Steel Corp., Wheeling, Va., has plans for modernization and pansion of its Wheeling district facili involving expenditure of up to $50 lion.

Jones & Laughlin Steel Corp. is pu ing an improvement program at its v ous plants including construction o 175-ton open hearth at its Otis work Cleveland.

Kaiser Co. is installing additional cilities at its Fontana, Calif., plant, w the Pacific States Steel Corp., Niles, Ca has started a postwar expansion progr and the Seidelhuber Iron & Bronze Wo Seattle, has launched plans for a sheet mill.

These are only a few of the impor projects under way in the steel indus

Extent to which the new facilities come into production over coming mo depends upon the degree of success will be attained in obtaining neces equipment. The industry's building gram in 1946 was thrown far off sched by strikes and equipment holdups. this connection, Mesta Machine Co., P burgh, important builder of steel equipment, reported its operations year were severely retarded by difficul attending procurement of raw mate and items required to complete or on its books. In addition construc work and installation of equipment steel mills were hampered by strikes labor problems. Uncompleted busi on the company's books at the end 1946 totaled approximately $37 mil as against $20 million at the end of 19

Chief cause for the existing steel sh age is attributed by steel industry ex

es to the strikes last year which re-lted in monthly loss of over a million ns of finished steel from potential pro-uction.

LATES . . .

PLATES PENDING

00 tons, plant, Yale & Towne Mfg. Co., Philadelphia; Turner Construction Co., Philadelphia, engineer in charge.

0 tons, 30 propane tanks, Minneapolis, for United Petroleum Gas Co.

0 tons, warehouse, Murray Corp., Scranton, Pa., on which A. Smith Co., Detroit, has been awarded the general contract.

0 tons, Colgate Palmolive-Peet plant at Jeffersonville, Ind.; Turner Construction Co., Philadelphia, engineer in charge.

5 tons, U. S. engineer, Memphis, Tenn., inv. 80, also 68,000 pounds hot-rolled annealed sheets; no bids received.

0 tons, addition to the Jamestown Metal Equipment Co., Jamestown, N. Y.

TRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

00 tons, veterans' hospital, Buffalo, through the United States Engineers, to Bethlehem Steel Co., Bethlehem, Pa.

00 tons, veterans' hospital, Albany, N. Y., through United States Engineers, to Harris Structural Steel Co., New York.

00 tons, power plant for Philadelphia Electric Co. at Norristown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

00 tons, two boiler stations, each requiring 2000 tons, one at Mishawaka, Ind., and the other at Grand Station, W. Va., for the American Gas & Electric Service Corp., New York, to American Bridge Co., Pittsburgh.

00 tons, approach to state Passaic river bridge, New Jersey, through Ole Hansen, Vetnor, N. J., to Mt. Vernon Bridge Co., Mt. Vernon, O.

80 tons, apartment house, 70th St. and Park Ave., New York, awarded by Sam Minskoff, to Harris Structural Steel Co., that city.

5 tons, telephone exchange building, Pawtucket, R. I., to Bethlehem Steel Co., Bethlehem, Pa.

0 tons, board plant, Sigurd, Utah, for U. S. Gypsum Co., to Kansas City Structural Steel Co., Kansas City, Kans.

0 tons, state bridge, Route S3, section 4A, Clifton, N. J., through James Mitchell, Jersey City, N. J., to Phoenix Bridge Co., Phoenixville, Pa.

5 tons, paper mill building, S. D. Warren Co., Westbrook, Me., to American Bridge Co., Pittsburgh.

0 tons, Pennsylvania Salt Mfg. Co. plant, Wyandotte, Mich., through Ford, Bacon & Davis, New York, to Whitehead & Kales, Detroit.

5 tons, conveyor manufacturing building, Chicago, for Goodman Mfg. Co., to Mississippi Valley Structural Steel Co., Decatur, Ill.; bids Feb. 19.

8 tons, sheet piling, Ludington, Mich., for United States Engineer, Milwaukee, to Bethlehem Steel Co., Bethlehem, Pa.; bids Jan. 20.

0 tons, addition, Rochelle, Ill., for Whitcomb Locomotive Co., to A. C. Woods & Co., Rockford, Ill.

0 tons, Delaware & Hudson Railroad bridge, Grandville, N. Y., to American Bridge Co., Pittsburgh.

0 tons, finishing building, International Paper Co., Palmer, N. Y., to Lackawanna Steel Construction Co., Buffalo.

0 tons, Washington state bridge, Morton iver, to Isaacson Iron Works, Seattle.

0 tons or more, cofferdam, Bureau of Reclamation, Denver, spec. 1571, to American Bridge Co., Denver, $171,855.

stated tonnage, steel sheet piling, U. S.

engineer, Milwaukee, inv. 57, to Bethlehem Steel Co., Bethlehem, Pa., $15,026.85.

STRUCTURAL STEEL PENDING

6600 tons, veterans' hospital, Fort Hamilton, Brooklyn, N. Y., to be re-bid Mar. 17.

3100 tons, field house, Lexington, Ky., for University of Kentucky; action on bids of Feb. 20 postponed to Mar. 11.

2500 tons, Army barracks at Fairbanks, Alaska; award pending.

450 tons, truss span, Jenks, Okla., for State Highway Department.

102 tons, Rock Island Arsenal, Ill.; also 157 tons carbon plate steel; inv. 82, bids Mar. 13.

100 tons, Abbott power plant, Urbana, Ill., for University of Illinois; Sargent & Lundy, Chicago, engineers; bids postponed from Feb. 21 to Mar. 13.

REINFORCING BARS . . .

REINFORCING BARS PLACED

400 tons, expansion, Minneapolis, for Archer-Daniels-Midland Co., to Laclede Steel Co., St. Louis.

213 tons, including 150 tons wire mesh and 63 tons bars, cont. 2794, Marion county, Indiana, for State Highway Commission; mesh to American Steel & Wire Co., Chicago, and bars to Carnegie-Illinois Steel Corp., Chicago; McCalman Construction Co., Danville, Ill., contractor; bids Jan. 7.

150 tons, expansion, Menominee, Mich., for Ansul Chemical Co., to Ceco Steel Products Co., Omaha, Nebr.

100 tons or more, for Bonneville Power projects, to Alaska Junk Co. and Mercer Steel Co., Portland, Oreg.

REINFORCING BARS PENDING

10,000 tons or more, Army construction in Alaska; awards pending.

900 tons, medical building, University of Washington, Seattle; general contract to J. C. Boespflug Co., Seattle, low, $1,868,011.

338 tons, including 270 tons wire mesh and 68 tons bars, paving project F-5, Marshall county, Illinois, for State Highway Department; bids Feb. 28, none received.

300 tons, University of Washington, Seattle, construction; bids in.

300 tons, expansion, Milwaukee, for Plankington Packing Co.; bids Mar. 10.

204 tons, mechanical engineering building, Urbana, Ill., for University of Illinois; James McHugh Construction Co., Chicago, low on general contract; bids Feb. 27.

PIPE . . .

CAST IRON PIPE PENDING

1900 tons, Yakima, Wash.; bids in.

1100 tons, Seattle improvements; bids in.

100 tons, Pullman, Wash., improvements; bids in.

Unstated, 13,000 feet, 4 and 6-inch pipe, King County District No. 54; also fittings; bids Mar. 11 to Parker & Hill, Seattle, engineers.

Unstated, 19,000 feet, 4 and 6-inch pipe, Swan's Trail Water District, Everett, Wash.; bids Mar. 19; R. E. Wolff, Seattle, engineer.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chesapeake & Ohio, 10 baggage mail cars and 8 post office cars, to Pullman-Standard Car Mfg. Co., Chicago.

Estrada de Ferro Central do Brasil, 63 all-stainless steel passenger cars, to the Budd Co., Philadelphia; estimated cost, $4 to $5 million.

LOCOMOTIVES PLACED

Argentine State Railways, 90 diesel-electric locomotives, to Whitcomb Locomotive Co., a subsidiary of the Baldwin Locomotive Works, Eddystone, Pa.

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

LOS ANGELES—K. H. Davis Wire & C Corp., 2417 E. 23rd St., has plan compl for two story, 91 x 133-ft plant, 2260 Santa Fe Ave., to cost $210,000.

OAKLAND, CALIF.—L. A. Young Spring Wire Corp., 900 High St., contempl converting three buildings and construc additional unit, containing 200,000 sq ft house auto cushion plant. Project to cost million.

REDDING, CALIF.—Sierra Tractor & Eq ment Co., 1246 Park St., Chico, Calif., awarded contract for one story, 100 x 1 ft warehouse, shop and office to H. H. La Co., 64 S. Park St., San Francisco, for estimated $100,000. C. F. Dean, Califo State Life Bldg., Sacramento, Calif., archit

CONNECTICUT

NEW BRITAIN, CONN.—New Britain Mac Co., South St., has awarded contract for story building and plant additions to Ha & Downes, 55 W. Main St., for $131,457

FLORIDA

LAKELAND, FLA.—Babcock & Wilcox h been awarded a city contract at $159,955 light plant steam generator.

ILLINOIS

CHICAGO—Slag Products Inc., c/o Am Johnson Co. Inc., 1514 Van Buren St., awarded contract for one story, 237 x 2 ft. factory to A. L. Jackson Co., 161 E. I St., for an estimated $159,000. K. Schmidt & Norman T. Maxon, 82 W. Wa ington St., architects.

IOWA

OTTUMWA, IA.—City will build a sewage posal plant which with equipment and au aries will cost $2 million.

KANSAS

HUGOTON, KANS.—Stanolind Oil & Gas Stanolind Bldg., Tulsa, Okla., has a bids for commercial synthol plant, to $4,500,000, and gasoline plant, to cost million.

MASSACHUSETTS

SOMERVILLE, MASS.—City will extend sewage system at a cost of $2,308,700.

WORCESTER, MASS.—Norton Co., New B St., plans construction of factory and po plant to cost $250,000.

MICHIGAN

DETROIT—Burroughs Adding Machine 6071 Second Bldg., is having plans prep by Albert Kahn Associated Architects Engineers Inc., 345 New Center Bldg., factory addition, to cost approxima $350,000.

DETROIT—Winter Bros. Stamping Co., 7 Lyndon Ave., has awarded contract for a tion to stamping plant to Campbell Const tion Co., 3255 Goldner St., for an estim $75,000.

WILLOW RUN, MICH.—Kaiser-Frazer C has awarded contract for pattern shop to D & Armstrong Inc., Detroit. Giffels & V Inc. and L. Rossetti, Detroit, associated e neers and architects.

MISSOURI

ST. LOUIS—Pieper Lillard Corp., 818 C St., has been formed by Donald H. Sheet manufacture and sell electrical equipment machinery.

ST. LOUIS—Union Electric Co. of Miss 315 N. Twelfth Blvd., plans rehabilita and modernizing Ashley St. power genera plant, at cost of $5 million. Day & Zim

mann, 231 S. LaSalle St., Chicago, consulting engineers.

ST. LOUIS—Johnston Tinfoil & Metal Co., 6106 S. Broadway, has awarded contract for one-story, 109 x 122-ft factory addition to Woermann Construction Co., 3800 W. Pine Blvd.

NEW JERSEY

DEEPWATER, N. J.—E. I. duPont de Nemours & Co. has let contract for manufacturing building to own forces for $120,000.

JERSEY CITY—Western Electric Co., 100 Central Ave., Kearny, N. J., has awarded separate contracts totaling $480,000 for altering plant. United Engineers & Constructors Inc., 1401 Arch St., Philadelphia, engineer.

TRENTON, N. J.—Crescent Insulated Wire & Cable Co., 319 N. Olden Ave., has awarded separate contracts for manufacturing plant to cost over $100,000.

NEW YORK

NEW YORK—Fisher Bros. Steel Corp., 297 Morris Ave., has had plans drawn up by Julius Eckman, 17 E. 42nd St., for two story warehouse and office building, Webster Ave. near Claremont Parkway, to cost $145,000.

NORTH DAKOTA

GRAND FORKS, N. D.—Minnkota Power Cooperative Inc. will soon take bids for construction of electric generating plant to cost $1 million.

OHIO

CLEVELAND—Star Welding Co., 5140 Superior Ave., has asked for bids on factory and office building, 1100 E. 134th St., to cost $60,000. W. S. Ferguson, 1910 E. 26th St., engineer.

CLEVELAND—U. S. Steel Supply Co., 2394 E. 39th St., will soon let contract for two story, 50 x 100-ft warehouse office addition, 7200 Bessemer Ave. Osborn Engineering Co., 7016 Euclid Ave., engineer.

OKLAHOMA

TULSA, OKLA.—Southwestern Power Administration received a low bid of $242,554 for proposed 132 kv rural distribution line from Denison substation to Brown from Elliott Construction Co., 527 Sunderland Bldg., Omaha, Neb.

PENNSYLVANIA

FRANKLIN, PA.—Franklin Creek Refining Corp., plans construction of two story power plant, to cost $100,000.

JOHNSTOWN, PA.—Bethlehem Steel Co., 701 E. Third St., Bethlehem, Pa., has awarded contract for wheel plant, to cost $511,000, to own forces.

PITTSBURGH—Calig Steel Barrel Co., 200 S. 21st St., has awarded separate contracts for manufacturing building to cost $60,000.

RHODE ISLAND

PROVIDENCE, R. I.—Kestennan Bros. Mfg. Co., 150 Chestnut St., will build a 1-story, 79 x 280-ft factory to cost $100,000.

TEXAS

DALLAS, TEX.—Massey-Harris Co., 615 S. Marquette St., Racine, Wis., has had plans prepared by J. Elliott, c/o owner, and Christensen & Christensen, 1327½ Wood St., for one story shop and warehouse, to cost $175,000.

HOUSTON, TEX.—Shell Oil Co., 1401 Shell Bldg., has awarded contract for laboratory building to Knutson Construction Co., 2233 Commerce Bldg., for $276,000.

HOUSTON, TEX.—American Smelting & Refining Co., Clinton Rd., plans construction of plant on ship channel, to cost $500,000.

HOUSTON, TEX.—Republic Supply Co., 502 N. Greenwood St., has awarded contract for one story, 75 x 362-ft warehouse to W. S. Bellows Construction Co., 716 N. Everto St., for $195,000.

HOUSTON, TEX.—Hughes Tool Co., 30 Hughes St., has had plans prepared by W. F Martin, c/o owner, for plant improvement and additions, to cost $100,000.

JACKSONVILLE, TEX.—Sheffield Steel Corp of Texas plans improving iron ore minin and processing plant at cost of $100,000.

PORT ARTHUR, TEX.—Monsanto Chemic Co., Texas City, Tex., plans construction o plant, to cost approximately $500,000.

PORT NECHES, TEX.—B. F. Goodrich Co plans expansion of synthetic rubber plan for about $250,000.

TEXAS CITY, TEX.—Monsanto Chemical Co contemplates construction of chemical plan to cost $1 million tentatively. Site has bee purchased.

VIRGINIA

DAYTON, VA.—Shenandoah Valley Electr Co-operative has $250,000 for purchase an installation of 1180 kw generating unit an construction of transmission lines.

HOPEWELL, VA.—Solvay Process Co. wi build a chemical plant addition costing $260 000.

WASHINGTON

CAMAS, WASH.—State will rebuild a 220- steel bridge over the Washougal river he at cost of $250,000.

RICHLAND, WASH.—Hanford Engineer Work General Electric Co., operator, has awarde contract to Morrison-Knudsen Co., Boise, Id ho, for general tank construction to cost $1 799,258.

WESTPORT, WASH.—City proposes to bui a $150,000 municipal water system and icin plant.

WISCONSIN

GREEN BAY, WIS.—Wisconsin Public Servi Corp., Bellin Bldg., is planning constructi of additional generating unit at steam plan to cost $5,250,000 including equipmen A. G. Carson, chief engineer.

KAUKAUNA, WIS.—Kaukauna Machine Co will build a foundry to cost $154,000.

MILWAUKEE—Wisconsin Electric Power C 231 W. Michigan St., plans eight new su stations and miscellaneous power work costi $5,200,000.

STOUGHTON, WIS.—Garden City Foundry C plans construction of $50,000 addition, contain 16,000 sq ft. CPA approval has be received.

CANADA

GREENWOOD, B. C.—Dentonia Mines L will build a flotation mill, at a cost of $12 000, with a daily capacity of 60 tons.

VANCOUVER, B. C.—Silver Standard Mi Ltd., 602 Hastings St., will build a $20 000 mining development.

WINNIPEG, MAN.—Dominion Chemical La oratories, 336 William Ave., will build a ma ufacturing plant and warehouse costing $10 000.

AMHERSTBURG, ONT.—S K D Tool C Murray Smith, manager, St. Arnaud St., w build one-story, 90 x 125-ft factory, to c $75,000.

CAYUGA, ONT.—Cayuga Gypsum Co. w build a plant which with equipment will c $175,000.

LONDON, ONT.—Canadian General Elect Co., Ltd., 212 King St. W., Toronto, O has awarded contract for factory to A. Robertson Ltd., 57 Bloor St. W., Toron for approximately $200,000. O. R. Mo & Co., 260 Dundas St., architect.

LONDON, ONT.—Empire Brass Mfg. Co. L Dundas St. E., will construct a 2-story, 60 120 ft. plant addition at a cost of $100,0

OSHAWA, ONT.—Willys Overland Co. I Toledo, O., will build a plant here at a c of $100,000.

SAULT STE. MARIE, ONT.—Mashkode Mi Ltd., c/o Tracy E. Carmichael, will build mining, milling and reduction project co ing $100,000.